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THE
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ORIGINAL COMMUNICATIONS.

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DISTURBANCES OF METABOLISM AND ITS RELATION TO CERTAIN DISORDERS OF THE RESPIRATORY TRACT. (A PRELIMINARY REPORT).*

DR. GRANT SELFRIDGE, San Francisco, California.

This paper is not intended for the "high brows" in medicine, but is meant primarily for those who, like myself, at the outset of my professional career, thought that the nose and throat were not functionally connected with the rest of the body, and to stimulate, it is hoped, those whose trend is not to commercial medicine and to the realization that surgery is far from a "cure all," at least in so far as many diseases of the nose and throat are concerned. Many of these diseases have their origin in disturbed physico-chemistry and deserve a further corroborative study on the part of those at heart really interested in the health and progress of the human race.

* * * * * * * * * * *

Life is physico-chemistry. Death but advanced physiology. Metabolism, the growth and death of the protoplasm and is, when referring to the human being, the study of the upkeep of the body cell. Any fault, therefore, in the proper chemical actions, reactions and interactions within the human body result in disturbed metabolism, disturbed physiology, and if continued, a vicious circle is formed and pathology results.

It has seemed to me that the above facts have been lost sight of by many of the medical men of today (nose and throat men in par-

*Read before the Eye, Ear, Nose and Throat Section of the San Francisco County Medical Society April 26, 1921.

ticular) and that this oversight is responsible for our failures to correct the physical troubles of which our patients in a large number complain. Likewise, it is these complaints of disturbed physiology so often presented, that are interpreted and called by many of the medical men consulted "imaginary or nervous" and for which little or nothing is done, and which finally drives the victim to the ranks of Christian Science or other cults.

REGULATORS OF METABOLISM.

The chemical "actions, reactions and interactions" within the human body seem to be under the control of certain "chemical messengers," activators and retarders (hormones and chalones) and these chemical messengers have their origin according to Henry Fairfield Osborn and the physiologists, Noel Paton and MacLeod, and the biochemist Robertson and others, in the endocrine gland system. If therefore, there occurs any alteration in the chemical actions, reactions and interactions on the part of the endocrines (pituitary, thyroid, para-thyroids, and gonads) as is evidenced by anomalies of growth metabolism, we may have disturbances of the vegative nervous system with symptoms of vagatonia or sympatheticotonia.

The hyperthyroidism, with its varied symptomology associated with defective secretion of the interstitial sex glands, mentioned by Hoppe, the vaso motor disturbance of the nose associated with the same conditions (gonadal), as seen in both sexes, similar conditions associated with dysfunction of the pituitary, the asethenias of hypo-adrenal states are conditions bearing on the subject of the unstable autonomic nerve system.

PRINCIPAL REGULATORS OF METABOLISM.

The Thyroid: The thyroid seems to be the principal regulator of carbohydrate metabolism, but is also concerned in the metabolism of proteins and calcium, though the regulation of the latter is deferred by some writers to the parathyroid and by Bell to practically all the endocrines. The increased metabolism of Graves' disease and the decreased metabolism of myxedema are well known. The slight signs of hypo-thyroidism (formes fruste of Leopold Levy) and the decreased metabolic states are frequently overlooked but are indeed of the greatest importance. Engelbach (Endocrine Amenorrhoea) says: The thyroid subject shows a retardation of growth and the development of the carpal bones is the most significant osseous sign. There should be one carpal bone developed to its periphery for each year of the individual's life.

The Pituitary: The pituitary is concerned in its anterior lobe with the metabolism of growth, especially the bones and sex organs,

as well as the skin and subcutaneous tissues. The posterior lobe with carbohydrate metabolism (probably regulatory). It likewise has to do with blood pressure, body temperature, with water regulation (as diabetes insipidus) and through its relation to the vagus with spasms of unstriped muscles (bronchial, and intestinal). Increased carbohydrate tolerance and lowered basal metabolic states are found, according to Engelbach and Tierney, in hypopituitary as well as hypo-thyroid states. The reverse in hyper conditions of the pituitary and thyroid. Cases of retarded development, short stature associated with amenorrhea, the Froelich and the acromegalic types are instances of disorders of growth metabolism related to the pituitary.

The Thymus: According to Robertson (Principles of Biochemistry) the function of the thymus in growth is obscure and its true significance may perhaps be rather a storehouse of substances, for example Nucleic acid, which will be required in subsequent development, than a factory of growth-catalyzers. Timmie says its principal influence is in the first cycle of life, *i. e.*, to puberty. He gives a very interesting and satisfactory explanation of the abnormalities of growth as seen in the pre-adolescent type of eunochoidism, perhaps the best explanation so far published, especially so to one looking for therapeutic aids in this condition. He thinks the pituitary is the great activator of growth, that it becomes slightly underactive in those cases showing a tendency to overgrowth of the long bones, and that there is an increased activity of the thymus. The influence of the gonads appears during the end of the first cycle—at the puberty age.

The Gonads: The gonads play a most important role in human life though they do not have any direct influence on metabolism (Tierney). They have more to do in the dominance of the leading emotional phases, crimes, etc., and in many of the vagatonic upsets than any other gland. They are the real keynote of the Freudonian teachings. From the writings of Engelbach and Tierney, we must believe the gonads have the final say in the excessive growth of the long bones (eunochoid types) and probably much concerning the epiphyseal closing. In one of Engelbach's cases, the gaining of 40 pounds in weight in a very tall and very thin amenorrheic subject and the deposit of fat about the breasts and hips (trochanter region) following ovarian gland feeding is most illuminating.

The Adrenals: The adrenals stand as the great body supporter in emergency conditions. The demands for sudden great physical

action and its accomplishments depend on an adequate supply of adrenalin, and the emotions, fear, fright, anger, are likewise linked with the adrenals. They apparently, in addition to the daily needs of regulation of blood vessel tension, act as shock absorbers and the chemical substances which they manufacture seemingly act also as antibodies—chemical substances to neutralize the chemical substances gaining entrance from without, *i. e.*, foreign proteins (bacteria, pollens, animal hair).

Garretson speaks of the anaphylaxis of pollenosis and ingested proteins in hay-fever and asthma, as "mild shock reaction" producing a hypo-adrenia with resulting vagatonia.

The position of the adrenals in metabolism is related to the sugar reserves. Crile says adrenalin increases metabolism, which is seen in the sudden call of the tissues in forced exertions above mentioned.

The relief from the use of adrenalin or adrenalin with post-pituitary in the spasms of asthma, certainly tells some of the story of the probable relation of disturbance of the autonomic nervous system and over or under production of chemical substances on the part of the endocrines.

PAST AND PRESENT INVESTIGATION.

In several articles, I have called attention to the endocrine system and its probable relation to disturbances of the upper and lower respiratory tract (hay-fever and asthma). As this work has progressed, I have come to believe that the principal underlying disorder is one of metabolism, showing itself in carbohydrate handling and body growth, and I have welcomed the advent of any laboratory aid, helpful in proving this probable relation, particularly so since several medical men have looked upon the endocrines as not having the slightest relationship to disturbances of the autonomic nervous system, particularly asthma and hay fever (true and false).

Therefore, since the advent of the portable Benedict calorimeter and the Tissot gaseous apparatus and the published work of Janney and others on disturbances of metabolism in certain endocrine gland distrophies (thyroid and pituitary) we have undertaken these studies in individual suffering from asthma or hay-fever (true and false), hyperplastic ethmoidits, and some cases of chronic infections of the paranasal sinuses. Many of these cases had frank evidence of endocrine disturbance, low blood pressure, subnormal pulse and temperature, asthenia, sex frigidity, abnormalities of sex organs, skin and hair, fat distributions and over or under growth

of the skeletal structures. In some, the latent thyroid trouble has only developed after careful laboratory studies coupled with the most valuable aids set forth in the various writings of Engelbach and Tierney, and their pituitary classifications. The recognition of signs of pituitary disorders or the possible pituitary predominance seems most important, and even in the face of a lowered metabolic reading, jumping to the conclusion that thyroid deficiency is the cause, may prove fallacious. In this connection, Engelbach (Endocrinology, 1920) mentions a case with basal metabolic rate —30 per cent, improving to +8 per cent, on a six week treatment with extract of pituitary (anterior lobe); this is indeed suggestive.

It has been stated by Janney and others that these basal metabolism readings can be made just as well in a private laboratory, the only requirement being a fifteen hour fast, followed by one-half hour rest prior to the determination. In the majority of cases no doubt this is true, but an occasional error may occur, as is evident in our asthma case, No. 15. This patient entered the hospital after a night's rest. The first determination —1 per cent. Just as the reading was finished, the patient fell asleep and another reading made during sleep was —20 per cent. One week later, the patient entered the hospital in the afternoon and the reading made the next morning in the patient's room was —44 per cent.

The importance of doing these tests in hospitals in doubtful cases, especially in cases that seemingly might be reported back "within normal limits," is self-evident. Such error easily spells error in diagnosis, error in treatment.

FAILURES IN SURGERY.

In a certain percentage of the surgery performed by nose and throat men (10 to 30 per cent), and indeed by general surgeons as well, the surgery fails to benefit the patient on whom the operation is performed. This is true particularly in the surgery of hyperplastic ethmoiditis (here the failures approximate 100 per cent) and in the removal of tonsils and adenoids from the exudative diathesis type of child and for the relief of hay-fever and asthma and many other ills to which this class is subject.

It is likewise true in a large percentage of cases of the operations for the cure of cold-catching tendency and for the relief and cure of those suffering from chronic recurrent infections of the nose.

Our own surgical failures for many years past have stimulated the study of the fundamental reasons for the failures, and for a

few years a slowly accumulating evidence has finally convinced me that the foundation for the *failures was* disturbed endocrines depending in many instances on faults of inheritance (parental). We have observed frequently during the past years, individuals of the exudative diathesis type (status lymphaticus) particularly in children who had anaphylatic types of colds, asthma, spurious hay-fever, who had ceased to show a normal increase in weight and who showed evidence of the frusté type of ductless gland deficiencies, and who have *evidenced* marked improvement in all their symptoms from the giving of gland substances.

TYPE SUSCEPTIBLE TO RECURRENT INFECTION.

Janney, in his article "Concerning the Diagnosis and Treatment of Hyperthroidism," speaks of the "liability of infections" as one of the prominent conditions found; and Engelbach and Tierney say of the hypo-pituitary subject that he is prone to infections. McGarrison also mentions the susceptibility of cretins to infections and also refers to sufferers of Graves' disease as having an "enfeebled resistence to infections."

My own observations covering a period of several years have been confined largely to the exudative diathesis type of individual and to those appearing to belong to the status lymphaticus type described by Ewing.

These people are of an anaphylactic type—have attacks of vasomotor rhinitis (true or false hay-fever) with frequently bacterial invasion of their sinuses following and consequent to the vasomotor paresis which involves the antrum of Highmore (in one case of true hay-fever I found the antra full of serum) and have repeatedly during the height of the hay-fever season washed pus from the antrum, irrigating through the natural opening.

They are likewise subject to attacks of asthma, have eczema in early life, have an anaphylaxis following the eating of eggs and other foodstuffs. They have their tonsils and adenoids removed for the various troubles to which they have been subject. They are not improved after the removal of their tonsils. They are sway-backed, flat-footed, have drop ears, deformities of teeth, palate and septum.

A very large number of these cases do not show any sensitivity to very complete testing with proteins (pollens, foods, animal hair, and bacteria). With or without evidence of skin reactions to proteins we find other alterations from the normal on applying the classifications of Engelbach and Tierney for pituitary dis-

orders, or we note the type frusté of thyroid deficiency described by Hertoge, Leopold Levy, McGarrison and others.

With his evidence in view, we believe then that we have sufficient clinical data on hand as well as therapeutic evidence, in the physical improvement of series of cases of all types herein before described, under endocrine gland substance medication, to warrant the claim that endocrine dysharmony was the prime factor in many of the disorders mentioned.

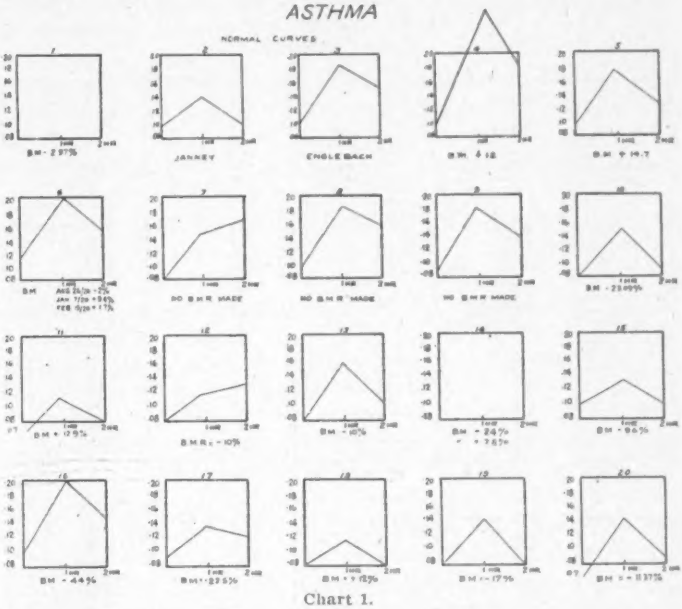


Chart 1.

Therefore, in support of these views, we have undertaken the basal metabolism and blood sugar studies in the series of cases herewith submitted under the following heads:

1. Asthma.
2. Hay-fever (true).
3. (Recurrent Infections); (Vasomotor Rhinitis); (Hyperplastic Ethmoiditis).

ASTHMA.

Blumgarten, "Endocrines," in Internal Medicine, says of asthma, urticaria and hay-fever "in spite of the fact that these asthmatic, and hay-fever patients give definite protein reactions, that the

etiological role of these proteins has not been definitely proven. Careful scrutiny of these asthmatics and hay-fever patients will often reveal that many of them, whether they are sensitive to the various proteins or not, have definite endocrine stigmata, and a definite ancestral history of hay-fever and asthma can be obtained in a majority of cases."

Lawrence (*Boston Medical and Surgical Journal*, August 5, 1920) reports a case of hay-fever (spurious) who later developed asthma; was sensitive to certain foods, but showed many signs of

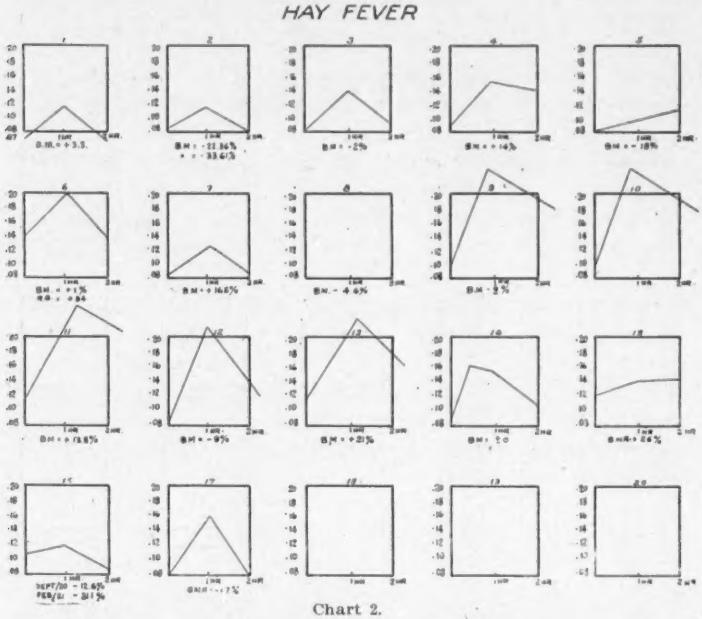


Chart 2.

pituitary insufficiency. Lawrence considered her unstable metabolism was reflected in her skin tests. The patient was given whole lobe pituitary extract and was allowed to eat the food which gave skin reactions to testing. As long as the pituitary was taken there were no attacks of sneezing or asthma, but an ommission of the medicine for 48 hours was followed by anaphylactic symptoms.

Many writers during the past few years have referred to the influence of the endocrines in disturbed functions of the autonomic nervous system—hay-fever and asthma. Many of these refer-

ences can be obtained from papers published by myself in the past three years.

HAY-FEVER.

The analysis of ragweed pollen gives the following composition: "Alcohol soluble 42.9 per cent, moisture 5.3 per cent, crude fibre 12.2 per cent, pentosans 7.3 per cent, ash 5.4 per cent, dextrin 2.1 per cent, protein 24.4 per cent—of the protein 7.5 per cent could not be extracted." The alcoholic extract (42.9 per cent) contains fat 10.8 per cent, lectithin 0.75 per cent, ether soluble, 1.75 per cent, sucrose 0.4 per cent, glucose 1.6 per cent, resin 17.4 per cent, and a nitrogen base. Heyl (*Journal Am. Chem. Soc.*, July 1917). The biochemist, Dr. Powers (London) a biochemist of note says no help can be expected from the biochemist in the study of the chemistry of these complex toxalbumens which have to do with hay-fever.*

Robertson tells us that our "resistance to the invasion of parasites is determined by special chemical agents which our own tissues manufacture—the various antibodies." He thinks that the erection of defenses against such plagues (the recent pandemic of influenza) and the common infections of the respiratory or alimentary tract "will never be possible until we understand the chemical composition and the chemical reactions and interactions when these proteins come in contact within the human body."

It appears from the many reports on influenza, and it is quite evident that the adrenals bear the brunt of this disease, and that many of those who succumbed belonged to a type presenting signs of asthenia and other marks of status lymphaticus. It is well known that the adrenals bear the brunt of shock and it has even been suggested that the adrenals and the thyroid also are engaged in the manufacture of the chemicals known as antibodies.

A very large percentage of hay-fever subjects have very low blood pressures, sub-normal pulse and temperature, more or less marked increase in the neutrophile-eosinophile cells, and exhibit various marks of disturbance in growth metabolism.

If this is true, then it is not unreasonable to believe that the adrenal system, perhaps already defective (from heredity or infections in early life) cannot by itself produce sufficient chemical substances to neutralize the tox-albumes present in the pollen grains.

The problems involved, therefore, in the study of this perplexing complex—surely suggests the study of the faults in the chemical regulators of this type of anaphylactic individual.

*Other biochemists in this country agree that the chemistry of tox-albumens can be determined without doubt.

Reviewing the charts of basal metabolic rate of cases of asthma and hay-fever, it will be seen that ten asthmas showed the rate on the minus side, —2.97 to —44%; —four cases plus (+12 +14%). Hay-fever shows, of the seventeen cases charted, that nine are on the minus per cent side, five on the plus per cent side. One case, No. 4, *was three months pregnant,* which would alter her normal reading. Two were normal. No. 3 and 13 were definitely types of hyperplastic ethmoiditis.

A few of the blood sugar curves are in the normal limits of Janney. There are, however, differences of opinion between writers (Janney, Engelbach and others) as to what is the normal blood sugar curve, and until this is settled, it appears as though the aid expected from such an examination is not forthcoming.

Without going into the details of clinical signs, it is sufficient to say that nearly all the cases charted above, presented some abnormality in their endocrine signs, after the classification of Engelbach and Tierney, and the syndromes of Barker and the recorded sign of Leopold Levy, McGarrison, and Janney.

We are not reconciled to the statement of Janney and others that the various basal metabolic rate readings of the various calorimeters in use, mean over or under-action of the thyroid. We feel that the clinical signs of the predominating syndrome must, after all, cast the deciding vote for therapy to be used. Among the series of hay-fever and asthmatic cases whose sugar curves and basal metabolic rate have been determined, many are taking some endocrine gland substances. The hay-fever cases have, in addition, their pollen solutions. It is my intention during the coming months to keep them (the hay-fever cases) on gland treatment and to see if their next hay-fever season (1922) can be obviated without their pollen solutions.

In the series of hay-fever cases treated during the past four seasons, I have seen but one case who did not require the injection after the second year. Howe, of Brooklyn, New York, I understand, claims a number of cases showing immunity for a period of one to ten years following immunization of one season.

Another series of cases I hope to carry over on gland treatment alone. A comparison of results will, therefore, be presented in a subsequent paper. *

INFECTIONS—VASOMOTOR RHINITIS.

In the following block will be seen the basal metabolic rate and blood sugar curves of several cases, presented because their types

*Also the subject of the treatment of asthma will be considered in another paper.

are most commonly met with in the average nose and throat practice. All these cases, except Nos. 6 and 12, at the time of examination gave a history of present or recent evidences of purulent secretion from the nose. Nos. 6 and 12 showed the anaphylactic type of cold.

The three following cases are submitted because of their undoubted endocrine origin. Cases 2 and 3 show definite evidences of disturbances of growth metabolism, definitely benefited by endocrine therapy.

Case 1 (*Chart No. 1*): This case is most interesting. Her symptoms began six years ago in July and lasted three months; frequent sneezing colds, water, mucoid, sometimes purulent discharge with tendency to travel downward; asthma. Tonsils out, some deflection of the septum and boggy lower turbinates. Nothing in sinuses—negative to thirty pollens—food, animal hair and bacteria. Nervous and worrying type. Height 55½ inches, weight 160 lbs. Small eater. Fat pads below scapula—most fat from hips to ankles and put on in recent years—profuse public hair; masculine type on breasts and legs. Menstruation began at sixteen; scanty, lasting two days; no dysmenorrhea. Impossible to reduce. Backaches, constipated, dry skin.

Based on the basal metabolic rate reading, thyroid grs. 1 daily for three weeks brought basal metabolic rate from — 22.5 per cent to —6.9 per cent. No change in fat padding. Whole lobe pituitary grs. 2, t. i. d., now added. One month later marked change in fat pads; practically gone but no change in weight. Disappearance in nasal and tracheal symptoms. Five months after commencing treatment reports that the restriction of carbohydrates plus pituitary and thyroid resulted in 10 pounds loss in weight. Only one cold in eight months—thinks she feels better than she has for years.

Remarks: The interesting features of this case are, the absence of relief fom the removal of the tonsils in the cold-catching tendency and the improvement in general as well as the local (nasal) conditions on the institution of glandular therapy. Next, the failure of thyroid to reduce the fat pads, which did not disappear until pituitary was added. It is interesting to note the effect of small doses of thyroid necessary to change the basal metabolic rate from —22.5 to —6.9 per cent.

Case 2 (*Chart No. 6*): Boy, age 14. Colds, stuffy nose, anaphylactic type. Tonsils and adenoids removed. No improvement of nasal condition but general health is better. Boy was backward

in school—mental intelligence test put him in 11 year class. Is the eunoichoid type.

Measurements (August, 1920); heighth 58 inches, span 62 inches, symphysis to soles of feet 31 inches, torso 27 inches. X-ray of hands

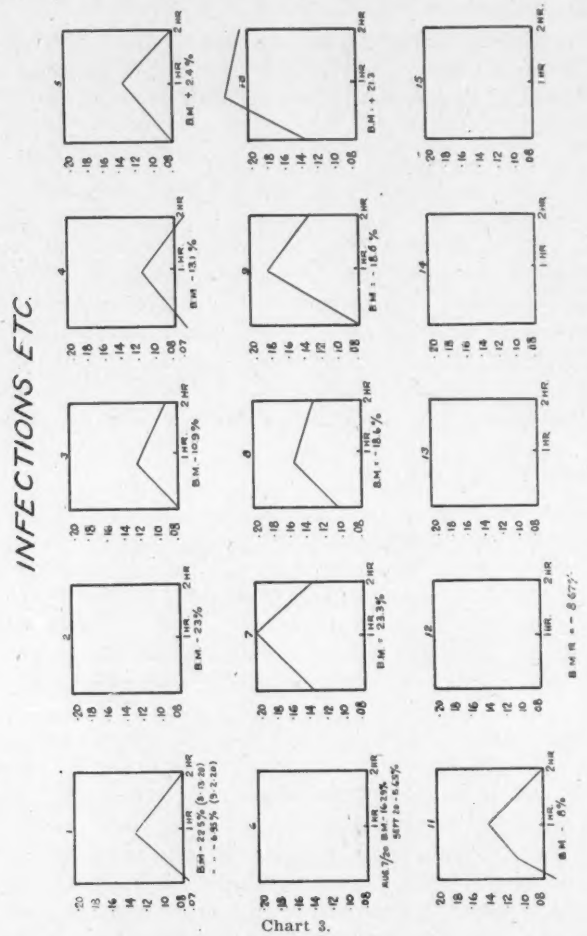
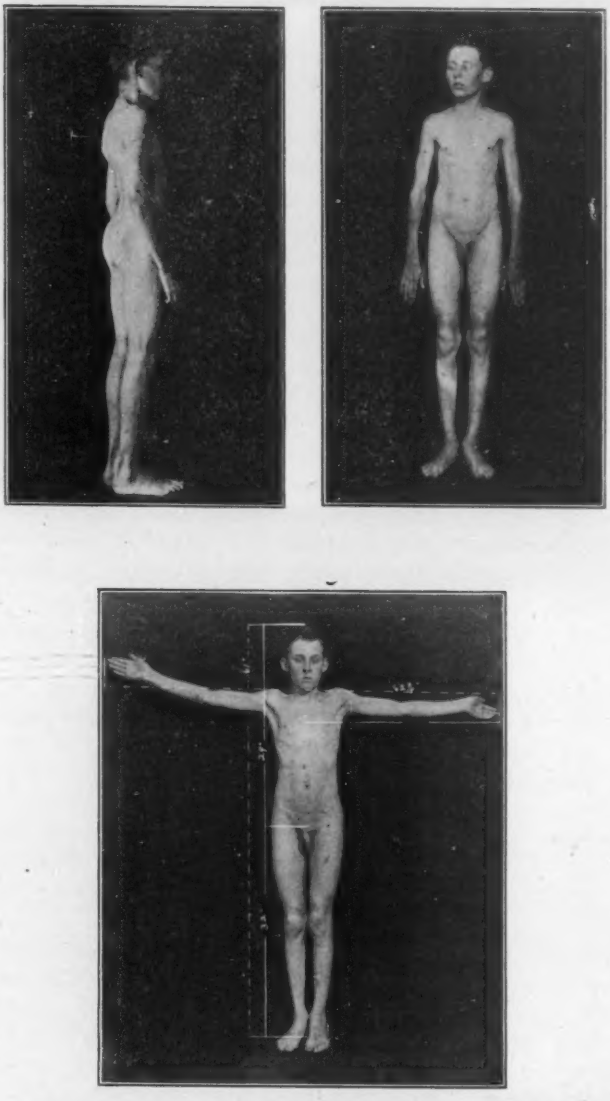


Chart 3.

shows terminal phalanges typical of a hypo-pituitary. Basal metabolic rate —16.29 per cent. Weight 76 pounds. Sex organs small. He wet the bed as a child, was constipated, skin dry, sway-back, prominent scapula, flat feet, large central incisor teeth.



Measurements—after the method of Englebach and Tierney.

Under thyroid grs. ¾ daily, basal metabolic rate increased to —5.68 per cent (two weeks). Extract pituitary (anterior) grs. 6 daily in addition to thyroid.

March 25, 1921: after seven months treatment, patient has gained 14 pounds in weight. He shows increase in torso of 2 inches, less disproportion between long and short bones. Sex organs double the size. Public hair beginning. Much *improvement* in school work particularly in the branches he was formerly backward in. Personal ambition improved.

August 20-21: Psycological report—made one year after the original. Accompanying the report, is a letter in which the analyst says "As you see his mental age is still 11 years, but it comes much nearer to 12 than it did before."

"The lad, I believe, belongs to a borderline type of individual. His mechanical ability and manual dexterity are good enough to make it possible for him to be able to support himself without any difficulty. I should not regard this lad as feeble minded, but rather as a dullard, with manual ability which exceeds by far his intellectual work."

This case surely suggests careful study of physical signs as well as mental intelligence and that treatment is frequently worth while even in spite of a bad family history, (maternal insanity in this instance).

Case 3 (*Chart No. 12*): Boy, age 14. Frequent serious type of colds with occasional serious catarrh of ears. Three operations on adenoids and one for tonsils between the age of five and nine. At two years had whooping cough, measles at nine. At age eleven developed lack of energy. Twelve years, nervous spells, out of school several months. At age of fourteen, recurrence of post nasal obstruction, loss of energy. At that time the lymphoid tissue back of the posterior pillars was found to be tremendously enlarged (half the size of a thumb). No view of the nasopharynx on account of these enlargements. At this time his basal metabolic rate was —8.67 per cent.

Measurements: height 69 inches, stretch 74 ½ inches, symphysis to foot 37 inches, torso 32 inches. His skin was dry, public hair feminine type, none in axillae. X-ray of hand showed no abdolescent union of epiphyses. Thyroid gr. ½ daily was given with improvement in general symptoms, and some slight change in the lymphoid masses. Thyroid was replaced by whole lobe pituitary grs. 12 daily for a period of several months. The results show

March 23, 1921, X-ray: beginning union of epiphyses; measurements: height 70 inches, stretch 74½ inches, symphysis to soles 37-½ inches, torso 32½ inches. Almost complete disappearance of lymphoid masses, school work excellent, very little irritability.

Comment: This case seems to show that the lymphoid structures about Waldeyer's ring were necessary to the economy and shows the results seen frequently after the removal of tonsils and adenoids. The disappearance, after pituitary feeding, bears out the views of Citelli and others on the relationship of adenoids and tonsils to pituitary and thyroid.

CONCLUSIONS.

The trail of life is a rocky one from birth to senescence, and, in so far as physical and psychical conditions go, can frequently be made smoother by assisting, when evident, the disfunctioning endocrines.

Disturbed physiology precedes pathology and our pediatrists can perhaps assist in the scheme of life by developing a plan for the recognition, especially in the female child, of important endocrine upsets of the slight types in early life, and which appear to be connected with abnormalties of body growth.

In the work herewith submitted, much time and thought have been expended, and while, to quote a medical writer, "Much gravel has to be washed before pay dirt is struck," we hope and believe that others, who may be persuaded to duplicate this work, will now and then find one, among this world of unappreciative public, whose cure by such study is sufficient emoluent for the many vicissitudes encountered.

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Schroth Bldg.

THE ENDOCRINES AND THE NOSE AND THROAT.*

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When one attempts to study the relation of the endocrines to the nose and throat, he is struck with the similarity to the explorer who arrives in the Land of Promise, filled with great possibilities, but which has thus far been explored merely upon its outskirts. Upon the subject of endocrines, volumes have been written within the last few years but little that is positive and tangible to the practicing physician has been definitely determined. We realize more and more that the endocrine secretions form the background of all our physicial and vital forces, but cannot definitely point to this or that influence as being positively due to any certain gland to the exclusion of all others.

It is the close interaction of some, and in some cases of all, the endocrine secretions that makes the subject so difficult to study. Each secretion appears to act in conjunction with others, at times with one to accomplish one object, at other times with another to accomplish another purpose. Apparently, each has many complex functions, that at times antagonize and at other times synergize with secretions from other endocrine glands.

We are gradually coming to a realization that individuals, people and even races, come under some predominating endocrine influence which helps to mould their features, characteristics and temperaments. For instance, the Negro is pituitary in type with his broad glabella, low bridge, wide nostrils, heavy features, combined with his love of music and sexuality. The Polynesian, Mongolian and some Slavic nations have similar conformities.

Age also appears to be an important factor in determining the status of the endocrine predominance, it changing frequently in the same individual during the different cycles of life. In early childhood, the sexual endocrines or gonads are practically dormant and the thyroid function is below par, while the pituitary function is in marked supremacy. It is during this period that we have the most rapid bone growth, with the presence of large tonsils and adenoids, exudative cartarrhal conditions of the nose and throat, the low state of immunity to contagious disease (a distinctly subthyroid

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state), the prevalence of the markedly vagotonic diseases such as laryngismus stridulus, pertussus and asthma.

When we reach puberty we find the gonads asserting supremacy with the host of physical and psychic changes that occur at that period. Here again, we see the nose and throat share in the influences brought to bear. In the male, we readily note the change in the character of the voice. The close interrelation of turgescence and hypertrophy of the turbinate bodies to frequently repeated and long continued sexual excitement, especially in prostitutes, has been recognized for years. We are all familiar with Fleiss' "genital spots" or "turberosities" in the nasal mucosa, the cauterization of which will often control uterine spasm during dysmenorrhea. The frequency of turbinal turgescence during menstruation is also a well recognized condition.

During pregnancy gynecologists have often witnessed the peculiar perversions of smell or paresthesias, these patients are prone to exhibit and the laity itself can testify to the impelling and overpowering desires for odd foods (the "gelusten" of the Germans) the pregnant woman will express. The sense of smell has been a secondary sex organ from the time of our Darwinian ancestors, especially in the male, as still shown in the lower animals.

It is during adult life that the thyroid and adrenals, working in conjunction, maintain the balance of proper metabolism, vital strength and activity. It is in relation with these glands and especially the adrenal, that social status has its most important bearing. Under those conditions, where we have deficient nutrition with exhaustion from over fatigue and nervous strain, we find exhaustion of the adrenal secretions. This was commonly found during the last war in underfed war-weary soldiers.

From the above brief survey, it can be seen that the subject is as broad as the realm of life itself, and that its influences may be subtle and beyond control or may, possibly, be influenced by us if we take the trouble to consider our patients from the broader viewpoint. In so far as the bearing the different endocrine organs have upon the nose and throat, that again can be viewed from two different aspects, viz., from the standpoint of the influence of the different endocrine secretions locally and from the standpoint of the symptoms produced by diseases of the endocrine glands themselves and the methods employed to eradicate the same.

When we consider the local action of the endocrine secretions, we find that the gland that has received the greatest amount of

study in all its endocrine relations is the thyroid gland with its associated parathyroid bodies. When this gland is in a state of hyperactivity, it gives rise to but few local symptoms. There may be persistent dryness of the mouth with excessive salivation. The teeth are bluish white in color. In advanced cases the coagulation time is considerably prolonged. These cases rarely show any upper respiratory infections, the thyroid endocrine being one of the most powerful factors in the development of natural immunity. At times, focal infeotion itself bears a causative relation to the hyperthyroid activity, in which case this immunity is broken down. It is then that recurrent attacks of tonsillitis constitute a very disagreeable complication of exophthalmic goiter.

It is in the subthyroid state that we find most evidences in the upper respiratory tract. This type of individual frequently has a sallow complexion, scanty eyebrows, especially at the outer third (Hertoghe), puffiness of the face with precocious graying of the frequently scanty hair. The teeth are irregularly developed and decay easily. The skin is thick, dry and scaly. In advanced cases we get the typical picture of lack of development, etc., characteristic of cretinism or the condition characteristic of operative myxedema.

When we stop to consider the action of the thyroid secretion in the economy, it acting as a catalyzer aiding both in the building up and breaking down of the cells of the body, when we remember as Hertoghe puts it, "as soon as thyroid activity is impaired, the products of decomposition cease to be carried off at the required rate, with the result that they accumulate in situ in the form of mucin, fat and other by-products, the cells becoming clogged with them and a peculiar hard edema which does not pit on pressure is the result," we can more readily understand the phenomena we see in this condition. Then we can understand that we do not of necessity have to have a fully developed case of myxedema or cretinism in order to have physical evidences of deficient thyroid activity. We may have all degrees of dysfunction of this gland the same as in any other gland of internal or external secretion.

Among the conditions encountered in the subthyroid state is the hard, elastic inferior turbinate with some apparent infiltration of the submucosa. We find a tendency to the development of catarrhal conditions of the mucosa with hyperplasia frequently present. Nasal hydrorrhea, usually of the spasmotic type, is often encountered. Hyperesthetic rhinitis, so-called hay and rose fever, probably has an adrenal and thyroid hypoactivity as an underlying basis, allow-

ing the accumulation in the system of toxic waste materials, which render the trigeminal terminals hypersensitive to the action of pollens, prevalent at certain seasons of the year. As in asthma, etc., there must be some underlying endocrine dysfunction to explain why certain irritants act upon some people and fail to act upon others. The favorable action of adrenaline chloride during attacks of both asthma and hay fever and also the favorable action of thyroid extract, in many of these cases points to the vagotonic subthyroid nature of these affections.

In the subthyroid type we find also large tonsils and adenoids, mouth breathing and snoring. There is frequently present a hacking cough. We, at times, have infiltration and thickening of the larynx, including the arytenoids and vocal cords with the loss of the singing voice. We may also have infiltration of the submucosa of the bronchi and bronchiols with narrowing of their lumina, difficulty in breathing, cyanosis and asthma like attacks. The tongue is commonly thick and tooth marked and may be troublesome to keep out of the field of vision during operation. Owing to the tendency to a multiplicity of infections, these cases are not good operative risks from the standpoint of rapid recovery and they frequently do poorly postoperatively. Some of the cases have a tendency to postoperative oozing after tonsillectomy. The coagulation time and the bleeding time are both prolonged, probably through disturbance of the calcium metabolism.

In the subthyroid type, especially when associated with pituitary hyperactivity as is usually the case, the pituitary increasing its activity in the absence of the restraining influence of the thyroid endocrine, the patients are usually fat, slow, have cold hands and feet, show a marked tendency to naso-frontal headaches, are constipated, frequently suffer from acidosis, cyclie vomiting, sour brash and a fondness for sweets.

In the ear we may have infiltration and thickening of the tympanic membrane, middle ear and eustachian tube with the production of tinnitus aurium and deafness. Otosclerosis has been attributed by some to be due to subthyroid states because of the imbalance of the calcium metabolism found in this condition, but the majority of writers attribute the condition more to dysfunction of the adrenal and pituitary glands. Finally, it must be born in mind that the condition of thyroid deficiency can be of sudden onset in children, brought on by fright or operative shock which may account for some of the bad operative reactions.

In the hyperpituitary state, we usually find the association of the subthyroid state and we find it particularly characterized by heavy thickened features, with greatly thickened nose, coarse heavy overhanging eyebrows with prominent superciliary ridges, protruding thick lips, prominent hypertrophied lower jaw and widened interdental spaces. This condition is found chiefly in dysfunction of the anterior lobe of the pituitary. The exact action of the posterior lobe is not definitely understood, this lobe being mostly neuritic in origin and containing a smooth muscle stimulant, useful in raising the vascular tone and in gynecology.

Jackson has reported four cases of acromegaly of the larynx, in which the larynx was of enormous size, all portions being proportionately enlarged. He advises careful examination of the larynx in all hypophyseal states as he claims that at times the hypertrophy may be so great as to cause sufficient obstruction as to call for tracheotomy. He believes that the change in voice in acromegaly may be due not only to the changes in the tongue and resonating chambers, but also in the larynx itself.

Denker believes that otosclerosis is due to dysfunction of the hypophysis, basing his belief upon the fact that it becomes aggravated during pregnancy when there is considerable increase in the size of the hypophysis and on the fact that in susceptible individuals it develops at puberty, the period during which there is considerable stimulation of bone growth. It is also after puberty that we most commonly find the development of septal ridges, due to stimulation of septal growth without sufficient room for it to occur, owing to the presence of the rigid floor of the anterior fossa of the skull above and the rigid palate bone below.

The relation of the gonads to the nose and throat have already been touched upon and need not be reviewed again beyond the statement that excessive sexual excitement is detrimental to normal nasal conditions.

The adrenals, beyond the therapeutic activity of the extract as used in medicine, have been little studied in their relation to the nose and throat. Most of the investigations upon these glands have been in connection with their relation to the thyroid in the maintenance of the sympatheticotonic balance. Suffice it to say that in those conditions of profound asthenia and exhaustion, especially postoperative in type, adrenal exhaustion is frequently a large factor and if this phase of the condition is taken into consideration and the patient given appropriate treatment, the temperature often

will subside and the processes of healing will resume their normal activity.

On the basis of the experiments of Bossi, in which he removed one adrenal from sheep following which they promptly developed symptoms of osteomalacia, and from the fact that he was able to cure cases of osteomalacia clinically by injections of adrenalin. Beck and Pollock have used injections of adrenalin in both otosclerosis and in atrophic rhinitis with apparently good affect. They base the treatment on the pathological fact that the early changes in both diseases partake of the nature of an osteoporosis, the hollow spaces being filled in later with new bone causing sclerosis. Coldero has obtained good results in otosclerosis by the use of adrenalin and also by feeding vitamins.

The thymus gland has been the subject of more or less controversy as to whether it should be included among the endocrine glands or merely among the lymphopoietic structures. However, in so far as the upper respiratory tract is concerned, it matters little which view is taken. The gland is not essential to life, but in early childhood appears to assist in the control of the phosphorus and calcium metabolism. In a series of experiments with new born puppies, it was found that when the thymus was removed after the fourth week of life the animal suffered no ill effects, but when removed prior to that time it showed all the evidence of advanced rickets. In the human being the gland normally atrophies before seven years of age. However, when it persists or when it attains excessive size in early childhood it has been held responsible for many cases of sudden and otherwise unexplainable deaths following the mere administration of anesthetics or trivial operations. Timme has pointed out the compensatory function of the pituitary body in cases of persistent thymus gland.

Within recent years Browning has advanced the hypothesis that stammering is due to enlargement of the thymus gland and has been able to show enlargement of this gland in twenty-five consecutive cases of stammering of all ages. He considers that the enlarged thymus produces a reflex inhibition of the respiratory rate which interferes with the natural rhythm of speech. He has applied two to four treatments by the X-ray at intervals of from five to fifteen days with resulting reduction in the size of the gland and diminution of the stammering.

When considering the endocrine glands from the standpoint of their local effects in disease of the organs and of their accessibility

from the operative standpoint, we find that we have to deal with three glands only, viz.: hypophysis, the thyroid and the thymus glands.

In tumors and hypertrophies of the hypophysis, in addition to the general effects of the dysfunction of the endocrine secretions, we find the local effects of pressure with the production of persistent headaches, the vomiting from intracranial pressure and the local effects upon vision so well known to all ophthalmologists. Rhinologists are particularly interested from the operative standpoint since two ingenious operations have been devised to approach the gland from below, in order to perform decompression or partial removal without entering through the dura. Both operations have been performed in this country with success.

In the operation described by Hirsch, a preliminary middle turbinectomy is performed to give more room for the subsequent operation. A few days later a typical submucous operation is performed, only very complete at the posterior end. When the face of the sphenoid bone is reached, the periosteum is raised very carefully with a special elevator, care being taken not to buttonhole the periosteum in this situation. The face of the sphenoid sinus is then removed, the septum between the two sinuses broken down, then the floor of the sella tursica carefully entered, the bone wound enlarged moderately and the operation terminated. If desired, a small portion of the sypophysis may be removed, caution being exercised lest the dural cavity be entered.

The operation described by Beck consists in doing a preliminary turbinectomy and ethmoidectomy. This is followed by the entrance into the maxillary antrum as in the Caldwell-Luc operation in the incisor fossa. The antrum is opened widely with an electric burr, the posterior ethmoidal wall is broken through at its junction with the sphenoid, thereby entering the sphenoid cavity. After breaking down the septum between the two sphenoidal cavities, the postero superior wall of the sphenoid cavity is broken down with a special long electric burr, taking away the whole roof of the cavity, and exposing the bed of the hypophysis.

The thyroid gland is of importance in laryngological work, in that it undergoes hypertrophy with the formation of goiter. At times goiters exert pressure either on the trachea, causing stenosis and dyspnea, or upon the esophagus, causing dysphagia, or upon the recurrent laryngeal nerve causing unilateral paralysis and often a persistent brassy cough. At infrequent intervals we may en-

counter anomalous lingual thyroids at the root of the tongue, and these may also undergo hypertrophy causing typical rounded encapsulated growths at the root of the tongue.

When the thymus undergoes considerable hypertrophy, at times it causes pressure upon the trachea and may give rise to symptoms indistinguishable from laryngeal diphtheria, direct laryngoscopy clearing up the diagnosis.

In conclusion, the writer does not wish to leave the impression that in dealing with the endocrines we are able to work by rule of thumb and that we have clear cut pictures of single endocrine dysfunctions, but would rather like to emphasize the fact that we are constantly confronted with a complexity of symptoms and signs due to the close interrelation of the different glands which, in the end may become clear to us, but which are as yet not wholly decipherable at all times. It is our duty, at present, to assist in this pioneer work as much as possible by making careful observations of our cases with the endocrine actions in mind, and to use single endocrine therapy wherever possible in order to study its ultimate therapeutic effect, choosing that gland which appears to dominate the picture.

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OBSERVATIONS ON LATERAL SINUS THROMBOSIS FOLLOWING MASTOIDITIS WITH REPORT OF CASES.*

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The writer wishes to report three cases of sinus thrombosis and jugular resection following mastoiditis, which present points of unusual interest. They are chosen from a series of eleven cases, which occurred in our service during the past winter at the New York Eye and Ear Infirmary.

In one of these cases there arose the question of tying off or resecting the jugular vein of the right side two years after the jugular vein of the left side had been resected for sinus thrombosis. This led us to a critical study of the collateral circulation established after such a procedure had been performed. As a result of this study, it was concluded that the external jugular vein plays an important part in the return circulation under these circumstances. In other words, the venous blood is returned in the following ways:

1. Through the occipital sinuses to the vertebral plexus and then into the vertebral vein.
2. From the vertebral plexus into the pterygoid plexus, and then through the external jugular vein.
3. From the cavernous sinus through the Vesalian vein, then through the external jugular vein.
4. From the lateral sinus, through the condyloid veins to the vertebral plexus.
5. Through the ophthalmic and angular veins to the facial veins and then, the common trunk of the facial being tied off, to the external jugular vein.
6. From the superior longitudinal sinus to the parietal emissary veins, thence through the occipital and external jugular vein.
7. Through the foramen cecum to the nasal plexus, then to the pterygoid plexus, then to the external jugular vein.
8. Through the emissary veins to the diploe to the external jugular vein.
9. From the cavernous sinus to the internal carotid plexus, then to the pterygoid plexus, thence to the external jugular vein.

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The writer would, therefore, urge that in the resection or tying off of the internal jugular vein, it is of importance to preserve the external jugular vein as a means of giving better collateral circulation and particularly is it more important should the contingency arise of resecting the internal jugular vein of the opposite side at a subsequent operation. The detailed history of this case is as follows:

Israel G., age 9 years, was admitted to the hospital on March 2, 1921. He gave the following history. In June, 1919, he had a mastoidectomy performed on the left side at the Post Graduate Hospital. Three weeks later he had an operation for sinus thrombosis and jugular resection, on my service, at the New York Eye and Ear Infirmary. His present trouble started in the right ear on February 26, 1921, when he began with pain in this ear, which was followed by a myringotomy two days later. Since then the discharge has been constant.

Examination of the canal showed a pus discharge with marked sagging of the posterior canal wall.

An X-ray made on March 3 showed an exceedingly cloudy pneumatic mastoid on the right side with the sinus possibly a little forward, but deep.

A smear from the canal showed a mixed infection of streptococci present. The urine was negative.

His right mastoid was operated on March 5. The mastoid was found to contain free pus and granulations throughout. A large area of sinus was exposed at the knee. The wound was treated and dressed in the usual manner and the patient's condition seemed to be good until March 16, eleven days later, he had a jump in temperature to 104°.

A blood count was made at that time, which showed hemoglobin 60 per cent, red cells 3,680,000, white cells 17,000, small 3 per cent, large 2 per cent, trans. 0, poly 68 per cent, eosin. 0, myel. 0.

He was given free catharsis and his temperature gradually dropped in three days to normal. He had another jump in temperature to 105½ on March 20, when a blood culture was taken and another blood count. The culture was negative after twenty-four hours. The blood count showed 4,400,000 red cells, 16,200 white cells, 14½ small, 3 large, one trans., 81 poly., eosin. 0, mast. 0, myel. 0.

His temperature dropped to 102° that evening and the following day, March 21, to 105½°. A blood culture was again taken and

showed eighteen colonies of hemolytic streptococci after twenty-four hours. It was then decided to open the sinus and to be guided by the condition found in it as to our interference with the jugular vein. He was operated on March 22. The lateral and sigmoid sinuses were exposed. The sigmoid sinus was opened and a small mural clot was found. When pressure was relieved at the lower end of the sinus, free bleeding ensued. So it was decided not to interfere with the internal jugular vein. The temperature ran a zig zag septic course after this for one week when it was decided to try the effect of transfusion. The boy's father was selected as the donor but owing to a mistake in the laboratory in grouping the father's blood, a very unexpected and nearly disastrous result occurred. The transfusion was very skillfully done by Dr. Stetson, who first removed 500 c.c. of the patient's blood. He then introduced 60 c.c. of the father's blood when the boy showed unmistakable signs of anaphylactic shock. He began with severe pains in the abdomen, followed by a severe chill which lasted one hour and a half. His heart action failed. His mucous membranes became blue, skin cold and clammy and he passed into unconsciousness. By the aid of heat and stimulants and adrenalin, he was gradually restored and the following day Dr. Stetson gave him 800 c.c. of blood from a selected and properly classified donor. Following this, he showed a marked and rapid improvement and progressed to an uninterrupted recovery.

Louis F., age 37 years; nationality, Russian. Entered the hospital on the fifth of February, 1921, and gave the history of suppuration from the left ear for the past fifteen years with an acute exacerbation during the past 10 days. Examination of the left ear showed the canal filled with pus, the drum partly destroyed and tenderness over the mastoid. A radical mastoidectomy was performed on February 5, 1921 by my assistants, Drs. Coleman and Walters. The patient apparently did well until about a week later when his temperature became irregular and septic, ranging between 99° and 101°. Twelve days after the operation, February 17, he had a sudden jump to 104° when a blood culture was taken, which being doubtful, another culture was taken on February 18 and this showed, February 19, colonies of hemolytic streptococci. He was prepared for a lateral sinus and jugular operation, the operators deciding to perform the latter procedure first. Accordingly, they exposed and resected the internal jugular vein, tying off its branches. At the end of this step in the operation, the patient seemed to be in

a very poor condition, and it was deemed wise to defer opening the lateral sinus for twenty-four or forty-eight hours. On the 21, his condition still remained poor and it was decided to wait until the 22 before instituting further operative procedures. On the 22, he had a suspicious redness and bogginess all around the mastoid wound, which looked like erysipelas and which proved itself to be such. It is our custom at the hospital to transfer patients immediately to Bellevue Hospital, where they have a pavillion for erysipelas and so this patient was transferred without having had his lateral sinus opened. He remained in Bellevue two weeks, during which time nothing but the surgical dressing of the mastoid wound and neck wound was done. He was discharged as cured of his erysipelas in two weeks and returned to our clinic for surgical dressings. He progressed to an uninterrupted recovery without ever having had his lateral sinus operated upon.

Nathan S., age ———; entered the hospital January 11, 1921. Gave a history of constant discharge from the left ear for the past three weeks. Also had moderate pain in and about the ear for three weeks. He complained of deficient hearing, tinnitus and vertigo.

Examination of the left ear showed a thick discharge in the canal and a marked sagging of the posterior superior canal wall, with moderate tenderness on pressure over the mastoid.

A smear from the pus showed streptococci in long chains.

An X-ray of the mastoid revealed the left mastoid to be of pneumatic type but very cloudy, and the detail was indistinct, with the sinus a little forward.

On January 13 a simple mastoid operation was performed. The mastoid contained free pus and granulations throughout. There was a large area of sinus covered with granulations exposed at the knee.

This patient ran along with an irregular temperature between 99° and 101° for eight days when his temperature on January 21 rose to 104½°. A blood culture was taken on the 22 and proved negative. His temperature still remaining high, another blood culture was taken on the 24 and proved negative; but a culture on January 26 showed fifteen colonies of hemolytic streptococci. A blood count on the 22 showed 4,500,000 red cells, 11,000 white cells, 33½ small, 4 large, 5 trans., 61.5 polys., 5 eosin., mast. 0, myel. 0. Blood count on January 24 showed 4,500,000 red cells, 10,000

white cells, 30.5 small, 6 large, 1.5 trans., 62.5 polys., 0 eosin., 0 mast., 0 myel.

Crowe's sign was tried on this patient. After 4½ minutes, he gave positive reaction in that the veins of the forehead and of the left retina became distinctly engorged. This is the only case in our series in which we have been able to elicit this sign; but it is likewise the only case in which we have had a completely occluding clot, so that I believe it to be of value in that type of case.

The sinus was freely exposed and on opening it an organized clot was found, which extended back one and one-half inches from the knee when free bleeding was obtained. No bleeding could be obtained from the bulb end of the sinus. The neck was then opened for a jugular resection. When it was attempted to push the belly of the stern cleido mastoid muscle aside, it was discovered that the tissues of the neck were densely matted together so that it was impossible to distinguish where the carotid sheath was. Also, strange as it may seem the pulsation of the carotid could not be felt so that we were compelled to hazard a guess as to where the carotid sheath might be. So, using the landmarks, such as the hyoid bone and the large lymphatic gland, which usually lies directly upon the carotid sheath, we made our incision through this mass of fibrous tissue and were greatly pleased to find that we were right in the middle of the sheath and our vessels then came into view. The jugular vein was completely thrombosed and collapsed, as were also its tributaries, the superior thyroid, lingual and facial veins. They were ligated and resected. This patient progressed to an uninterrupted recovery. This represents a type of case of which the author has seen several.

157 West 73d Street.

THE DRAINAGE OF MASTOIDS AS A MEANS OF PREVENTING "SCARLET FEVER EARS."*

DR. A. M. DUNLAP, Peking, China.

During the past winter, the writer has been impressed with the necessity of attempting to prevent the drainage of the so-called "scarlet fever ears" through the tympanic cavities. Middle ears infected during an attack of scarlet fever probably have the streptococcus, as a causative agent, in practically all the cases. Certainly the great destruction of the sound-conducting apparatus observed as these infections subside and become quiescent would lead one to this supposition. If we are correct in assuming that the streptococcus never invades the tympanic cavity without extending not only to the mastoid antrum, but to the cells as well, then we must conclude that there is an acute mastoiditis along with the otitis media in most of these cases. Recent reports of steptococcus mastoids fully demonstrate the fact that there may be considerable involvments of mastoid cells without local symptoms. The profuse discharge, therefore, in these cases originates in the mastoid cells and the middle ear should not be burdened with their drainage if it is to extend over a period of weeks and months. In fact, the drainage through the middle ear should never continue to the time when there is definite destruction of the ear drum.

The causative agent of two acute "scarlet fever ears" observed recently was the streptococcus hemolyticus. Cultures made from both mastoids demonstrated it to be the same type as that causing a fairly large epidemic of mastoids among the foreign and Chinese members of the Peking community. These mastoids were both in the same individual, the first following a left acute otitis media some six weeks after the onset of the scarlet fever. The patient, a doctor, was at some distance from Peking, and in order to get our assistance, a daily report was sent. We concluded from the continued elevation of the temperature and the profuse discharge that the left mastoid should be opened, and Dr. J. H. Liu was sent to the patient's station to perform the operation. He found a large perforation which occupied almost the entire drum, but the long handle of the malleus was not yet attacked. On open-

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ing the mastoid, the cells were found to be almost completely destroyed and filled with pus. At the end of another three weeks, the right ear became inflamed, and, after pain for twenty-four hours, the ear drum ruptured. Three days later, the patient arrived in Peking and a mastoid operation was performed on the second ear. This was done regardless of the fact that there was no mastoid tenderness. The discharge was profuse and the temperature was slightly elevated. The mastoid cells were only partially destroyed but were completely filled with pus. This patient made rather a slow recovery and to our amazement, we found that both middle ear drums had become re-established and that hearing had returned practically to normal.

This case is given in contrast to a second: that of a little boy now under treatment, who had scarlet fever five years ago. Aside from syringing the middle ears, no attempt was made to treat the inflammatory process within the mastoid cells. As a result, the entire right ear drum has been destroyed, and only the upper part of the malleus is still intact. On the left, there is a fair amount of the ear drum yet remaining, although the lower end of the malleus is gone. For the past three years, an attempt has been made to irritate the edges of this rather large perforation on the left side and occasionally on the right, in order to get closure of the tympanic cavities, and in so doing to prevent the otorrhea, which appears whenever the child has acute rhinitis. The results have not been altogether satisfactory as the lower margin of the tympanic membrane on either side seems to be free of the original fibres which helped to make up its supporting structure. There has been sufficient closure on the left, however, to bring about a decided improvement in hearing, but the result is far from satisfactory.

Aside from preserving hearing the need for controlling the discharge in scarlet fever patients is important because of its infectious character. According to recent literature on the subject, scarlet fever cases should not be allowed out of quarantine as long as there is a discharging ear or sinus, which has originated as a complication of the disease. While we do not know how long these discharges continue to be a source of contagion, we do know that they are a menace and should be controlled as early as possible. The first case reported above illustrates the danger and the need for radical treatment. The first mastoid was opened during the period of quarantine and the usual precautions were taken so that, if this ear were a source of contagion, it did not have an oppor-

tunity to demonstrate the fact. The second ear infection occurred following the quarantine period, if one may overlook the discharging mastoid on the other side. As a matter of fact, no unusual precautions were taken with the discharge from this second ear, and the nurse who had been with the patient for weeks probably innoculated her own throat from finger which had come in contact with the wicks from the second ear. On the third day after the rupture of the second ear, she became ill and died within five days of a virulent type of scarlet fever.

These two cases illustrate conclusively to the writer's mind that, granted the patient be in condition for an operation at the time the mastoid is invaded following an attack of scarlet fever, no time should be lost in securing the drainage through an external wound, and thus relieve the tympanic cavity from the great strain which is put upon it in taking care of the discharges from the healing, but unperforated mastoid cavity. The writer does not mean to imply that every case of otitis media following scarlet fever goes on to mastoiditis, but he wishes to point out that in the light of our experience with these cases, a mastoiditis should always be suspected. A bacteriological examination of the discharges should prove invaluable. The rapidity with which the streptococcus can destroy the drum membrane and with it the small bones of the middle ear is so marked that nothing but the most careful and repeated examination of these cases should suffice. With nitrous oxide and oxygen anesthesia at our command, the simple drainage of the mastoid cells resolves itself into a perfectly safe procedure. The writer, in conclusion, wishes to recommend to the profession a greater interest in the so-called "scarlet fever ears" during the acute stage, that, from our combined experience, we may determine the best procedure for preventing a continuation of the existing high percentage of destroyed ears following the disease.

MASTOIDITIS WITH AN UNUSUAL NUMBER OF COMPLICATIONS, WITH RECOVERY.

DR. A. J. HUEY AND DR. W. H. SLAUGHTER, New York.

The following case is reported, not because of any unusual condition or disease, but because of the unusual number of afflictions which followed each other in rapid succession and from all of which the patient entirely recovered.

Case, A. M., (No. 2361, U. S. Public Health Service Hospital No. 43, Ellis Island, New York) nativity, Italy; age 30,; sex, male; race, white; admitted to the contagious service of the above named hospital on September 6, 1920.

History: Negative and unimportant.

Family History: This seems to have no bearing on his present condition.

Present Illness: (Obtained through interpreter) While traveling in the steerage on one of the trans-Atlantic liners, patient was taken sick nine days before arrival at New York. He claims to have run a fever, and three or four days afterward he says he developed a skin eruption. Three days before landing, the right ear, and one day before landing, the left ear began to discharge pus.

Physical Examination: *General*: Well developed and well nourished adult male of about twenty years of age. Does not appear to be very ill. Temperature 37.6 degrees C., pulse 90, respiration 24. *Head and Neck*: Both ears discharging freely. Submaxillary gland on left side enlarged and slightly tender. Examination of the throat shows tonsils to be enlarged and somewhat inflamed. *Chest*: *Lungs*: Negative. *Heart*: Negative. Apex beat at 5th interspace 7cm. from midsternal line. *Extremities*: Two vaccination scars on left arm. *Nervous:* Knee jerks normal. No Babinsk. No Koenig. Pupils react to both light and accommodation. *Glandular System*: Negative. *Genito-urinary System*: Negative. *Abdomen*: Negative. *Skin*: Generalized fading maculo-papular eruption, definite for measles. Routine cultures were taken from both nose and throat (a customary procedure in all cases admitted on the contagious service). Both cultures later proved to be negative for the Klebs-Loeffler bacillus.

Treatment: The patient was put to bed and given expectant treatment, together with soft diet. The ears were irrigated every four hours with a saturated solution of boric acid, follow-

ing which the ear drums were treated with a few drops of 95 per cent alcohol. Routine urinalysis taken on admission was negative.

On September 14, 1920, tenderness was noted over the left mastoid region. There was profuse serous discharge from both ears. Otoscopic examination revealed opening of both membrana tympanii. The left ear showed sagging of the posterior superior wall, together with slight redness of Shrapnel's membrane. X-ray examination showed slight haziness on left side as compard to right. Patient was transferred to the surgical service.

On September 16, 1920, mastoidectomy simple, left side, was performed by one of us (A. J. H.), pus, together with granulations in the tip, being encountered. The inner table was sound. Cultures made from wound at the time of operation showed short-chained streptococcus.

On September 18, 1920, the evening temperature was 40° C., pulse 110, respiration 20. The mastoid wound was dressed and appeared to be healthy. However, there was marked tenderness along the course of the left internal jugular vein. The patient appeared toxic. W. B. C. count was 10,500. Chest examination was negative. Sinus thrombosis was suspected. Blood culture taken.

September 19, 1920, blood culture showed a short-chained streptococcus. In addition to supportive treatment fluids were forced and patient was given 25 c. c. of anti-streptococcus serum intravenously.

September 20, 1920, condition of patient was unimproved. Temperature still elevated. Evidence of marked toxemia. There was redness and swelling of the third right metatarso-phalangeal joint. Tenderness was noted in the region of the left internal jugular vein.

The mastoid wound was opened and the left lateral sinus exposed (operation by A. J. H.). There appeared a blood clot in the lateral sinus; incision was made and clot removed, allowing free bleeding from the upper end, which was later packed with iodoform gauze Incision was then made in the neck and the left internal jugular vein exposed. An organized thrombus was found. The vein was ligated low down in the neck below the thrombus and the thrombosed part of the vein was excised.

September 21, 1920, condition unchanged. Chest examination revealed slight dullness at left base posteriorly with a few crackling rales. Moreover, there was redness, swelling, and definite limitation of motion in left elbow joint. Temperature was 39.8° C. In addition to the supportive treatment morphine was given to alleviate pain. Thirty-five c. c. of anti-streptococcus serum was given intrav-

enously. The same amount of serum was given on September 22 and 23.

September 25, 1920, the patient was extremely toxic. Sputum blood tinged. Right lung posteriorly gave dullness below the scapula. Bronchial breathing, together with moist rales, elicited in this area. Later, on the same day, there was a generalized eruption definite for urticaria.

September 27, 1920, there were definite signs of a frank lobar pneumonia over entire right base of lung. In addition to supportive treatment 40 c. c. of anti-streptococcus serum given intravenously. Urticaria generalized and marked on this date.

October 6, 1920, an abscess which had developed on the outer surface of the right arm was opened and six ounces of thick yellow pus evacuated. Cultures from this abscess revealed streptococci.

October 10, 1920, there was definite acute arthritis in the left knee. This member showed redness, swelling, limitation of motion. On this date was also incised and drained an abscess which had developed on the left side of the chest, mid axillary line, two ounces of pus being evacuated.

October 11, 1920, an abscess which had developed on the right forearm was opened and drained, five c. c. of thick yellow pus being evacuated. Dorsal decubitis had developed in spite of careful nursing, with special attention directed to the treatment of the back and limbs with alcohol.

The case progressed in a very satisfactory manner until January 21, 1921, when an abscess developed in the region of the coccyx. This was opened and about 250 c. c. of thick creamy pus evacuated.

Januray 28, 1921 there developed a definite parotitis on the right side. There was swelling, tenderness, together with an elevation of temperature to 39.4 degrees C. This condition responded to medical treatment and on February 5, 1921 had subsided completely.

On February 28, 1921 the patient was discharged from the hospital as having entirely recovered from the various afflictions enumerated.

Summary: To summarize, the individual was afflicted with, and recovered from, the following conditions: measles; otitis media, acute, suppurative; mastoiditis, acute; sinus thrombosis; septicemia; septic arthritis; urticaria; pneumonia, lobar; pyemia; parotitis, acute; dorsal decubitis.

Immigration Station, Ellis Island.
U. S. Public Health Service Hospital, No. 43.

INDICATIONS FOR OPENING THE MASTOID CORTEX.*

DR. FRANCIS P. EMERSON, Boston, Mass.

The classical symptoms of mastoiditis and the indications for operating are clearly outlined in every standard text-book. For the student, the didactic description of a typical mastoid is necessary, and the exceptions and atypical cases must be learned in the hard school of experience. Even for the consultant, it is one thing to see a case in a well ordered institution, with all its facilities for laboratory and X-ray help, and where an early paracentesis has been done, and quite another problem to be called on the fourth or fifth day of an active middle ear to decide whether to operate or not. An incomplete, or no paracentesis, may have been done, and the case may be so far removed from hospital assistance that reliance must be placed on symptoms that experience teaches, indicate or contra-indicate removal of the mastoid cortex. Fortunately, these symptoms of advanced bone involvement have been studied until to-day, few cases are met with that do not have some one indication present to warn us of danger, although there is no one symptom but that may be absent.

Indications: The indications that justify the removal of the mastoid cortex may be given under three heads: First, to remove a pyogenic focus threatening the life of the patient; second, to conserve hearing; third, to prevent a chronic mastoiditis.

In the presence of threatened complications, all these indications may be present in one case, or any one indication may lead us to decide that the best interests of the patient favor an immediate mastoid operation.

With an acute middle ear and mastoid involvement, it may be said that operation is the safer alternative. In order, however, to obtain an early dry middle ear and good hearing, it is necessary to choose a time for the operation when the bone abscess has commenced to be walled off by a leukocytic barrier, that is, has commenced to limit itself so that the involved area is definitely outlined and the infection has commenced to subside. In a series of twelve cases operated by the writer, in five cases the middle ear was dry on the fourth day, one on the fifth, one on the sixth, one on the seventh and four on the thirteenth to fifteenth day. While the

*Read before the Philadelphia Laryngological Society, Nov. 1, 1921.

type of infection, the resistance of the patient, and the question of reinfection must be considered as factors in delayed healing, yet the judgment of the operator as to when to operate, the writer feels, is the most important. We must remember that in all cases of virulent, middle ear infection, the mastoid is involved, and to operate in the congestive stage means a prolonged middle ear discharge and the danger that deeply placed cells may break down later. This is particularly true, if the operation is done when the resistance of the patient is low, as is the case when mastoiditis complicates an infectious disease. The writer observed two such cases in one service. One patient had a simple mastoid by an experienced operator and almost immediately showed symptoms of whooping cough. The mastoid healing went on normally. The temperature had been normal for three weeks, the wound was healed, except for a stitch abscess at the lower margin. At the end of the fourth week, the patient had sudden marked pain in the head, the temperature went up to 102°, and the white count to 26,000. No other cause being found, the wound was reopened by the writer, the cells found broken down around the lateral sinus and the sinus thrombosed back to the torcular. The other case showed late involvement of the deep cells but was otherwise of no particular interest. The question, of which mastoid to open when both sides are involved is often a serious problem for the most experienced. In most cases of acute middle ears with mastoiditis, we have as symptoms changes in the membrana properia, discharge, temperature, tenderness over the antrum and tip with sagging of the posterior superior canal wall. How far can we depend on these symptoms as indications for operative interference? Are there any other symptoms of equal importance in making our decision?

Membrana Tympani: A nipple perforation with a fibrinous exudate in the middle ear, or a so-called boggy membrane at the end of a week often indicates a low-grade process with a tendency to become chronic.

Temperature: The temperature is of no diagnostic significance and rarely goes much over 102.°

Posterior Superior Wall: Sagging of the posterior superior wall is perhaps the most constant and reliable symptom for operation in acute mastoiditis that we have. Even this symptom may be valueless owing to a circumscribed or diffuse external otitis. When the canal infiltration and a middle ear are associated, and particularly when the oedema has extended to the mastoid cortex, the diagnosis may be very difficult.

Tenderness Over the Antrum and Tip of the Mastoid: This is usually present during the first three days, and then, as the periostitis subsides, may entirely disappear. In itself it is not an indication for opening the cortex as it is present in practically all cases of acute congestion of the mastoid bone, whether it is to undergo resolution or not. Another local symptom is of great importance, and is illustrated by the following: A policeman was brought to the office with an acute ear. The drum was bulging, and there was extreme tenderness over the entire cortex. A free paracentesis was done under gas. The third day his physician 'phoned that the discharge had stopped and the tenderness had all gone. He improve so that on the sixth day he was out-of-doors. On the seventh day be had extreme pain and an immediate operation was done, when the entire bony structure of the mastoid was found broken down. In this case, whatever the condition of the patient, there was one symptom that should have indicated danger and the need of an operation, and that was swelling back of the tip with tenderness over the emissary vein. In the experience of the writer, when this comes on with the subsidence of the periostitis, we can predict deep bone destruction as probably going on. The absence of pain after the third day, is not unusual as the breaking down of the bony framework is not accompanied by pain unless a periostitis is present.

Discharge: The discharge, after seven or eight days, has two valuable diagnostic features. We say after seven or eight days, for the observation of Schwartze, that few acute mastoids need to be opened until the eighth day after the onset of the middle ear, with exceptions, still holds good. Then, if the discharge is more than can be accounted for by the middle ear condition, or if the serous discharge has become purulent, immediate operation is indicated. This is especially true if the patient is toxic.

Duration: After considering all the above indications for opening the cortex, we must also take into account the duration of the mastoid infection. Any case that does not show signs of improvement after ten days, may justify operation to preserve hearing or prevent a chronic mastoiditis.

Another danger in operating too early should be pointed out before leaving our consideration of acute mastoiditis. That is, that the original infection in the naso-pharynx may not have quieted down and the middle ear may become reinfected. This was shown in a case of double mastoid operation where the patient did well

for three days, when there was a marked increase in the middle ear discharge. On removal of the tonsils, the discharge immediately quieted down and there was a dry middle ear on the seventh day on both sides.

Night Pain: As the patient seems to be convalescing, it is always a suspicious symptom to have pain at night. This comes on after the patient has dropped to sleep and may be only sufficiently severe to awaken them. During the day it may be entirely absent and the patient feel normal.

Leukocytosis: The white count is a help only, and may vary from 10000 to 18000, and is more an indication of the resistance of the patient. When there is a sudden increase to 25000 or more, accompanied by a chill, it is a valuable indication of some complication, usually a sinus infection. The gradual recession is also indicative of a probable favorable termination. The polymorphonuclear neutrophiles are increased from 70 pc. to 85 ps. to 90 pc., and a sudden drop to 70 pc. shows a loss of resistance. A highly polymorphonuclear percentage indicates the severity of the infection.

Bacteriology: Type of infection.—The streptococcus mucosus and pyogenes or the pneumococcus with the micrococcus catarrhalis is considered by Loeb and Beck to strongly indicate that an operation will be necessary. This is an indication only, for patients react differently to the same infection.

Type of Mastoid: The type of mastoid is to be considered. The pneumatic mastoid is more apt to undergo resolution with useful hearing, and the infantile type, in a general way, is more apt to become chronic.

The X-ray is a valuable aid to diagnosis, if we remember its limitations, especially after the acute symptoms have subsided. It is very rare that we should consider operation on the X-ray picture alone. It needs the clinical picture to re-inforce it and some one skilled in its interpretation.

A high temperature, associated with nausea and vomiting, convulsions or severe headaches, would indicate immediate operation if mastoiditis were present. In children, these symptoms might come from a middle ear alone, therefore a free paracentesis may change the whole picture.

While the clinical picture of mastoiditis must be taken as a whole in forming an opinion for or against operation, yet the individual symptoms vary markedly in relative importance and some are almost diagnostic of surgical mastoiditis alone. The one safeguard

against mastoiditis, as a complication of acute otitis media, of supreme importance, is early and free incision of the drum membrane.

Chronic Cases: Indications for operations: (1) Continued suppuration resisting local treatment and accompanied by anemia and poor resistance of the patient. (2) Chronic discharge with cholesteatome. (3) Chronic mastoiditis with acute exacerbations in which the hearing is practically gone and treatment is unsuccessful. (4) Chronic mastoiditis with facial paralysis, chronic unilateral headache, labyrinthine or meningeal irritation. All cases showing any labyrinthine reaction are included advisedly. During the last ten years, it has been the policy of the surgeons of the Massachusetts Charitable Eye and Ear Infirmary to do a radical mastoid without opening the labyrinth as long as there was any cochlear or vestibular response. During this time only one case of menigitis has followed this practice. Not over two or three cases have been seen in which there was not some labyrinthine response, excluding cases of dead labyrinth. In 1920, there were 3000 ward cases and an average of 114 daily out-patient cases treated. (5) Chronic mastoiditis with polypi springing from the promontory and oval window.

While the tendency to operate is less marked than formerly, yet it should be impressed on the public and general practitioner that a chronically discharging ear is a menace to life. While aurists have felt that many patients died annually from meningitis, due to an unrecognized aural origin, yet the number of cases was not appreciated until the statistics of Kittredge were published in 1912. His investigation showed that in the state of New Hampshire there were more deaths from a simple meningitis, excluding tubercular and cerebro-spinal meningitis, than from diphtheria and scarlet fever combined; one-half of his statistics covered a period before the use of anti-toxin. During a period of four years there were 815 deaths from simple meningitis, and, as he says, it is fair to assume that most of them were secondary to a middle ear. The sequence of events is sometimes as follows:

Miss M., age 14 had had a chronic scanty middle ear discharge since childhood. An acute naso-pharyngitis was accompanied by marked frontal sinus pain. On the sixth day she developed a temperature of 104°—104.5° and became unconscious. No complaint had been made of the ear and the frontal sinus pain led the attending physician to suspect meningitis. A rhinologist was called in, who happened to be, also, an aurist. During the routine examina-

tion, a foul discharge was found in the middle ear and evidence of mastoiditis with probable sinus thrombosis. The patient was still unconscious and operation was refused on the ground that she would die anyway. The writer saw the case in consultation and advised tying the jugular. Practically no anesthetic was used, except for the skin incision. The mastoid was rapidly opened and the jugular tied by Dr. Porter. The patient recovered and left the hospital on the fourteenth day.

The local subjective symptoms in chronic mastoiditis may be entirely absent. There is a history of continuous or intermittent discharge. If intermittent during the acute exacerbation, the sagging of the posterior superior wall and possible tenderness back of the tip may be present. The subjective symptoms, however, in chronic cases, are not usually due to a periostitis and acute bone congestion with toxemia, but to interference with drainage and pressure, hence the pain is usually referred to the head. Sometimes the milder symptoms, such as headache and occasional dizziness, have been endured by the patient for a long time until sudden vertigo, nausea, severe headaches, convulsions or symptoms of meningitis demand relief. When patients do apply earlier on account of tinnitus, foul discharge or loss of hearing, the seriousness of the case requires a careful neuro-otological as well as middle ear examination. More often they should be observed over some time before a definite conclusion can be reached. In the interval, all foci in the naso-pharynx that might excite an acute exacerbation, should be removed and the drainage from the middle ear promoted by incision and the removal of desquamating epithelium, pus and bone detritus. Following this treatment, if the discharge does not stop or there are symptoms of complications, a radical operation should be done. We must remember that all the symptoms of meningitis, including a bacteriemia, with virulent organism in the spinal fluid, may be due to a complicating sinus infection and prompt removal of the cortex and ligation of the jugular may save the life of the patient.

ADDITIONAL EXPERIMENTAL STUDIES IN BRONCHIAL FUNCTION.*

Dr. Jesse G. M. Bullowa and Dr. Charles Gottlieb, New York.

Two years ago we reported, before the New York Academy of Medicine, * * * the results of our observations made by injecting radioopaque substances into the bronchi of dogs. We observed that the lungs emptied themselves by an accordion or bellows-like action of the trachea and bronchi, and also that there occurred a peristaltic wave of the bronchial muscles. These observations were undertaken to study the method by which the lungs evacuate their secretions. During the past two years we continued our observations and performed certain experiments which we are about to narrate.

We desired to make more visible the peristaltic wave, and if possible, to study the effect of interruptions in its continuity.

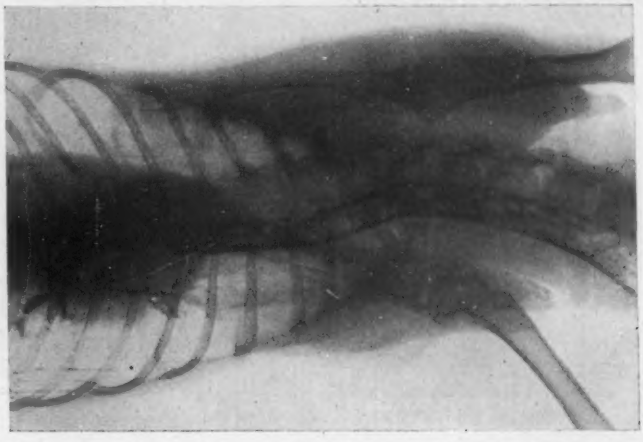
A wire haired fox terrier bitch weighing twelve pounds was anesthetised with ether and a collodion covered No. 2 capsule filled with barium sulphate was passed with a long alligator forceps into the right bronchus. The animal was observed fluoroscopically. After thirteen minutes the capsule had been expelled, it was seen to lodge in the trachea below the larynx and was watched rising and falling while the animal was held in a vertical position. She was re-anesthetised and two capsules were placed in the right bronchus. After seven minutes the animal commenced to cough and one capsule was seen in the trachea, the other in the right bronchus. There was very marked congestion in the right pulmonary field, evidenced by increased markings on that side. In thirteen minutes, without coughing, the dog had expelled the capsules to the trachea. After she swallowed the capsules, an empty collodion covered gelatine capsule was introduced into a bronchus with forceps, followed by 5 c.c. of barium in oil suspension for the purpose of showing a more radiolucent area in the site of the capsule. The peristaltic wave was distinctly visible but the procedure did not accomplish its purpose. (plate 7) At our next session, the lungs of this bitch were fluoroscoped and found normal. This time a gelatine capsule made apaque at both ends with barium was inserted and was seen under

*Read at the Section of Laryngology and Rhinology of the New York Academy of Medicine, December 21, 1921.

**Roentgen-ray Studies of Bronchial Function, Amer. Jour. Med. Sc., July, 1920. No. 1, vol. clx, p. 98.

the fluoroscope in a small bronchus. In eight and one-half minutes the capsule was expelled. The procedure narrated did not assist us in better visualizing bronchial movement.

On October 23 a twelve pound Boston terrier dog nine months old was anesthetised and then a paper clip, with the fingers bent open but held together with an alligator forceps, was inserted into the right bronchus. In ten minutes a ventrodorsal picture which showed the clip was taken. The dog did not cough, the lung fields were alike in appearance. On November 4, although the dog had not coughed, the paper clip was no longer in the dog. He had been



No. 7. October 23, 1920. Wire haired fox terrier. Peristaltic wave in trachea.

examined fluoroscopically on October 27—when the clip was present. This clip produced no symptoms; it had not been sterilized.

On October 27 the first animal, the wire haired fox terrier bitch, was fluoroscoped. The lungs were clear. Under ether, barium in oil was injected into the bronchi and a small piece of rubber tubing inserted. This bitch coughed considerably, had difficulty in breathing, revealed a typical peristaltic wave with marked shutting off of the left bronchi with each cough. This was due to the tubing. In ten minutes most of the barium had been passed out of the lung into the stomach with the exception of that in the right lower lobe. Thirty-five minutes later, the tubing was in the stomach though barium still filled the right lower lobe fairly well. In addition to these obstacles, we inserted a piece of sheet rubber containing

barium and bent into a U, and a plug of soft rubber bent into a core and shoved them deep into the bronchi through a bronchoscope. They were all easily expelled from the bronchus in less than one-half hour. Our attempts to place obstacles permanently in the air-ways and thus produce a stricture proved unsuccessful. Therefore, we modified our experiments and proceeded to traumatize the bronchial walls.

A Boston terrier bitch weighing fourteen pounds and one and one-half years old, had an incision made in the trachea with a portion of a razor blade securely fastened in a handle. The lung was

No. 41. March 30. Black and tan injected on March 28, shows barium still in right lower bronchus. See P. M.

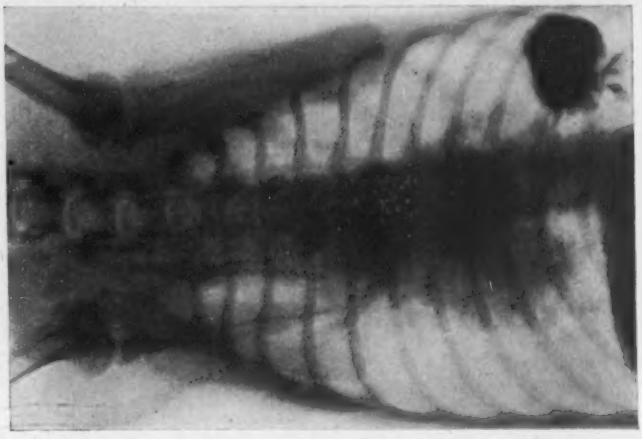
injected with barium; a peristaltic wave was visible, there was considerable coughing, yet the lung was clear in about fourteen minutes. There was certainly no delay in the emptying time. This experiment was repeated on an Irish terrier about the same size with a like result.

On November 11, a screw tail Boston terrier had its trachea cauterized with a galvano cautery; he was then injected with 5 c.c. barium in oil. The dog was fluoroscoped from time to time and thirty-five minutes later it was observed that barium was in the trachea at the site of the trauma; otherwise, the lungs were clear.

An Irish terrier was also cauterized deep in the trachea and then injected with barium. There was considerable coughing. After thirty-four minutes there was a marked contracture in the trachea

at the level, between the fifth and sixth thoracic vertebra. We interpreted this as an interruption in the peristaltic wave, due to the trauma.

In all, seven dogs were cauterized in the bronchi or trachea through a bronchoscope. Two of these dogs died during the operation of hemorrhage and perforation of the lung, due to excessive heat in the cautery; one dog died of a hemorrhagic gastritis, the autopsy revealing a pneumonia of the right upper lobe with large lymph nodes and without gross evidence of trauma in the trachea or bronchi. This dog was injected ten days after the trauma, al-

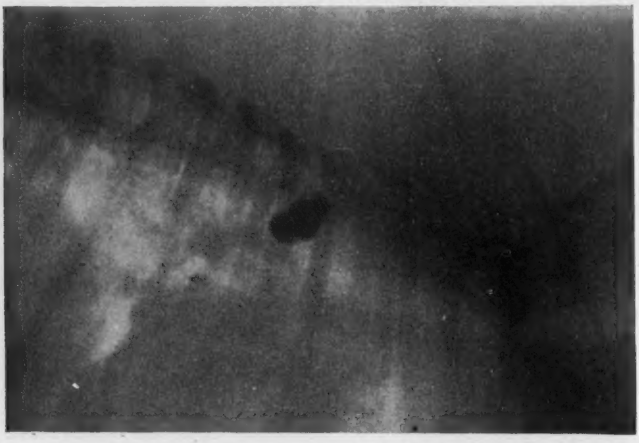


No. 42. April 1, 1921. Black and tan. Bronchus seared with heated wire through bronchoscope. Ether and morphine anesthesia on March 21, 1921. March 28, injected with barium in oil. March 30, barium still present in right lower bronchus. Cf. 41 and 42b.

though he was in poor condition and losing weight at the time. He died three days after the injection of barium.

Another dog which had been used for other experiments died of pneumonia two days after the injection of barium, which was made immediately after the cauterization of the lung. The lungs of this dog contained barium post mortem and were radiographed. The other dogs after injection showed a retention of barium below the site of injury. The most interesting of these dogs is a wire haired terrier bitch, which, before traumatization, emptied its lungs twice in less than thirty minutes after injection of barium in oil. On December 21, the right lower bronchus was cauterized. There was a severe hemorrhage and the end of the galvano cautery made of

nichrome wire fused. On December 27 it was reported by the veterinary that there were no signs of illness after the hemorrhage and the bitch was injected with barium in oil. One hour later there was still a confluent mass in the right lower bronchus. Repeated observations were made of this dog from time to time and the barium persisted in the lung and was still present on May 13. While under observation the dog gained in flesh and condition. Early in June the dog was sacrificed and the lungs presented. The outstanding feature is the smoothness and fibrosis of the bronchus leading into the barium collection. Through the kindness of Dr.



No. 43. Mongrel collie. 6 c.c. barium in oil injected into lung through right 7th interspace, April 13, 1921.

T. A. Gonzales, I have a report on the microscopic structure of this bronchus:

"The sections reveal filling of terminal alveoli with barium with reactionary thickening of the alveolar walls. Section of traumatized bronchus shows it denuded of epithelium. The submucosa is slightly thickened, the muscularis is broken in places, with fibrous tissue replacement. Some small cell infiltration persists."

It was first thought that possibly in these dogs the retention of barium was due to forcing it into the parenchyma of the lung. To test this hypothesis, two dogs which had previously been found to empty their bronchi promptly, were injected with barium through the chest wall in the right seventh interspace with 6 c.c. of barium in oil directly into the lung. One of these dogs, a black and tan,

gradually emptied the barium plug in the lung into the adjacent bronchus. (See plate 42) This dog was the one which died of a pneumonia after being injected immediately after a cauterization of the bronchus and the plate taken from the removed lung has been shown. The other, a mongrel collie dog, continued to show the barium in the lung near the right bronchus from April first until May 18 when, apparently in excellent condition, he escaped from observation. (See plate 43)

We have concluded from our experiments, in confirmation of our former observations, that a peristaltic action of the bronchial musculature is involved in the emptying of the lung. In the wire haired fox terrior, swelling at the site of the trauma was visible through the bronchoscope. Barium was retained below this level. At autopsy, no stricture is definitely visible and we believe that the fibrosis and consequent elimination of the bronchial muscle action accounts for the retention.

Finally, it is our great pleasure to thank Doctors C. C. Rohrer and Frank Weishaar, veterinary surgeons, for their assistance in experiments and their observations and care of the dogs.

62 West 87th St.
210 West 79th St.

CASE OF EARLY HODGKIN'S DISEASE IN WHICH ENDOSCOPY LED TO THE DIAGNOSIS.*

DR. LEE M. HURD, New York City.

F. G., female, 20 years of age, first seen by me on January 20, 1920, who consulted me because throat specialist wished to operate on septum and something in throat to relieve cough.

She has had a dry cough for one-and-a-half years, much worse the past four months. Pain over left eye and left side of face for past three months, which usually occurs in the afternoon or evening. Moderate nasal discharge, no impairment of breathing. Adenoids removed sixteen years ago. No sore throat. Teeth and ears O. K. Occasional hoarseness. Has lost ten pounds in past four months. No night sweats or fever. Appetite poor, sleeps well, constipation.

Examination of nose shows pale mucous membrane, slight deviation of septum and hypertrophied middle turbinate. Larynx and trachea, by laryngoscope examination, normal.

Wassermann negative. Von Pirquet positive. Small gland behind left clavicle.

Blood count 5,200,000 red, W.B.C. 16,000, polys 89 percent. S. L. 20 percent, L. L. 4 percent, basophiles 1 percent.

Urinalysis negative except slight trace of albumin.

Under morphin ¼ gr., atropin 1/100 and alypin, bronchoscope was passed down left bronchus, one-half inch below carina, where there was constriction and congestion. Manipulation of the constriction produced intense coughing, which a second dose of ¼ gr. of morphin did not control.

Blood count, May 2, 1921: W.B.C. 10,600, polys 75 percent, S. L. 20 percent, L. L. 4 precent, basophiles 1 percent.

X-ray examination by Dr. H. M. Imboden: There is a shadow on the left side, which suggests that it arises from the root of the lung, but it does not seem to have any connection whatever with the aorta. A dense shadow is also found super-imposed upon the arch of the aorta. This may be due to the same cause as the shadow previously described. The mass projects slightly into the posterior mediastinum, and as it projects into the mediastinum, it seems quite smooth in outline. This mass pulsated somewhat, but

*Read before the American Bronchoscopic Society, Atlantic City, 1921.

this was probably transmitted from the aorta. It certainly was not extensive.

There are definite changes in the base of the right lung, which are probably due to pressure from the mass in the left side.

Physical examination by Dr. Warren Coleman: Patient looks pale and ill. Heart, throat and teeth show nothing abnormal. The thyroid is enlarged, especially the right lobe. There is a small bunch of glands in the neck above the inner end of the left clavicle. Heart negative.

Lungs: Dullness over the roots of both lungs. Both lower lobes are imperfectly aerated. Both respiratory murmurs are slightly prolonged over the lower lobes. The chest is otherwise negative.

Abdomen: Both recti are very rigid, but move with respiration. Spleen and liver negative. There is tenderness in both iliac regions, especially on the left, low down. Indefinite resistance is felt deep down in the left iliac region, suggesting the possibility of glandular enlargement.

Diagnosis: Probable Hodgkin's disease.

Pathological report by Dr. James Ewing: "The superaclavicular lymph node shows the changes of an atypical Hodgkin's granuloma. The section shows obliteration of all normal landmarks by irregular new tissue, composed of lymphocytes, many reticulum cells, a few eosinophile cells, much fibrosis, no necrosis. The lesion is of rather long standing, and the node hard and fibrous. The structure is not entirely typical of Hodgkin's granuloma, but it is not a tumor, and is not tubercle or lues, so that by exclusion, the diagnosis of Hodgkin's is highly probable. Then, there are in addition many of the histological features of Hodgkins."

Has been under X-ray treatment. Mass in mediastinum has slightly diminished in size. Cough better. Otherwise no perceptible change.*

*December, 1921. Has complete recurrent paralysis of left vocal cord.

WAR INJURIES OF THE LARYNX WITH FIVE CASE REPORTS APPENDED FROM THE BRONCHOSCOPIC CLINIC OF DR. C. JACKSON.

DR. JAMES C. TUCKER, Beatrice, Neb.
DR. ROBERT M. LUKENS, Philadelphia, Pa.

In reviewing the literature on injuries of the larynx during the World War, one is always struck with the lack of definiteness and end results. This paper, from the data collected, has the same fault. An apology is offered for this defect because of the fact that very few of us were in a position to follow these cases definitely, as they were always moved on or evacuated here and there until it has been practically impossible to get reliable data as to end results.

The larynx, situated as it is, high up in the respiratory passage, not only serves as a part of the respiratory mechanism, but is the essential organ of voice production.

During the war the proportion of wounds of the larynx was rather small, considering the total number of wounds. This is probably to be explained by several factors. First, it is fairly well protected by the chin, vertebral column and shoulders, depending on the position of the body; second, the larynx is rather mobile and in a great many cases it evidently escaped injury by being pushed aside by the missle; third, the cartilages of the larynx are not devoid of elasticity and allow for a certain amount of compression and change in shape which may protect it somewhat. Statistics show that in the late war, in the British and French armies, the larynx was involved in about one in seventeen neck wounds. Delorme gives it as 3 per cent. Moure states that during the Crimean War, the larynx was involved once in about 460 wounds. We have seen no statistics for the American troops in action. In one Base Hospital with about 20,000 American admissions, we collected about forty injuries of the larynx of varying degrees of severity. Wounds of the neck without involvement of the larynx were more numerous. In times of peace, injuries to the larynx are very rare, being confined chiefly to attempted and accomplished suicides and accidents in industrial plants.

In the average text-book of laryngology, we are always impressed with the small amount of space devoted to traumatisms of the larynx. We have seen but very few injuries to the larynx in civil practice

and from the literature were always impressed with the gravity of any injury to the larynx. Now we think the war has demonstrated that the larynx is about as resistant to injury and infection and as amenable to repair and healing as any other organ of the body.

Of the cases which we observed while on duty at American Red Cross Military Hospital No. 1, A. E. F., at Neuilly, near Paris, we wish to report a few cases in some detail, the others were so similar that they will be considered collectively. During seventeen months' service in the nose, throat and ear department, we saw some forty-nine (49) cases of gunshot injuries to the larynx of various kinds, thirty-one (31) were in Americans, fifteen (15) in the French, three (3) in the British.

Case I. J. H., Pvt., Co. L, 28 U. S. Inf., G. S. W. perforating, "S" "IA" entrance right side of neck just anterior to sternomastoid muscle, exit left side of neck through left sterno mastoid, by M. G. bullet that had traversed larynx at Cantigny, France, May 28, 1918. Patient first taken to French Ambulance 14/3 and H. C. A. No. 38, where he was treated by Dr. Dalle of the French army, the laryngologist on duty at that place, who sent report with patient as follows: G.S.W. by bullet, entrance right carotid region, exit large and infected at sterno mastoid region left at level of larynx. At the orifice of exit, pus flowed on movement of head. At the exit, a sort of trap door had formed from the tissues which opened and closed with the respiratory movements. Aphonia. Operation May 29, 1918, nothing done to wound of entrance, debridement of wound of exit. Found F.C.C. of thyroid cartilage. A median incision was made, laying bare the larynx and the upper rings of the trachea. Attempted suture of fragments of thyroid cartilage, but state of wound did not permit good coaptation. The laryngeal mucosa was very oedematous, especially at the level of the ventricular bands and the glottic region. A high tracheotomy tube was put in place and two sutures inserted in fragments of cartilage and neighboring tissue to attempt to hold fragments of cartilage in place. Orifice of exit sutured. During operation, patient had to have stimulants. A few days following, on account of suppuration, sutures at exit had to be removed. He was sent to us June 12, 1918, with the above report and tracheotomy tube still in place and with a note to the effect that it could probably be removed. Patient received by us June 13, 1918, in good general condition. Able to swallow. Wound of entrance healed, wound of exit still suppurating. Tube was removed when received, but reinserted on the same day on account of dyspnea. Finally removed June 18, 1918. At this time it was

possible to distinguish cords from mucosa. Treatment: sterile dressing to external wounds and mentholated oil spray to larynx. Symptoms were aphonia for all sounds except whisper, some cough which was very much worse at night, and on lying down. Patient's general condition improved and he was up and about after the 18th. He was evacuated July 15, 1918. At this time, swelling and oedema of the larynx had subsided enough that cords were plainly distinguishable. Adductor paralysis of left cord. Right cord somewhat restricted in motion. Some suppuration and infiltration at wound of exit. General condition good.

Case II. C. B. P., private, A. Co., 30th Inf. G.S.W. perforating, "S" "IA" entrance sterno mastoid muscle, traversing larynx with F.C.C. right side cricoid cartilage; exit left side neck at upper level larynx, with F.C. left side thyroid cartilage, by shell fragment at Chateau Thierry, France, July 17, 1919. Admitted to A. R. C. M. H. No. 1, July 17, 1919, nothing having been done previously except administration of anti-tetanic serum and sterile dressing over wounds. Patient admitted on litter and rather weak from loss of blood. Symptoms, dysnea and aphonia. Debridement of wounds of entrance and exit by Dr. Lukens. Patient had been unable to swallow on account of paresis of tongue and palate. Wounds dressed twice daily with iodoform gauze. Feeding through nasal tube. Paresis gradually cleared up and by August 3, 1918, patient could swallow soft foods and voice cleared up until could talk audibly, but with difficulty. Cords approximate O. K. General condition good at time of evacuation, August 4, 1918. Patient up and about. Letter received from patient December, 1920, states that he has had no further treatment and that he is perfectly well, but voice weak on exertion.

Case III. L. D. B., Pvt., L. Co., 28th Inf. G.S.W. "S" "IA" multiple, one fragment perforating larynx at Cantigny, France, May 28, 1918. Shell fragments removed at F. H. No. 12 before coming to us, May 28, 1918. Received by us June 11, 1918, at which time wound of entrance healed, wound of exit still suppurating. Had adductor paralysis right vocal cord. Symptoms of aphonia and dyspnea. Evacuated July 15, 1918, in good general condition. Wound of neck entirely healed. Still had paralysis right vocal cord and slight aphonia.

Case IV. J. A. S., Sgt., Co. A, 16th Inf. G.S.W. "S" "IA" neck, entrance right side near anterior border of right sterno mastoid muscle, level of larynx, exit left sterno mastoid muscle after

traversing larynx by bullet at Soissons, France, July 18, 1918. Received by us next day, nothing having been done to wound. Larynx inflamed and difficult to distinguish cords from mucosa. Some dyspnea and aphonia except for whisper. Sterile dressing to external wounds. Mentholated oil to larynx. External wound healed within a week. Evacuated July 27, 1918, in good condition. Duty one month later.

Case V. R. E., Pvt., Co. G, 28th Inf. G.S.W. "S" "IA" by bullet penetrating larynx at Soissons, France, July 18, 1918. Abductor paralysis right vocal cord, which cleared up in a week. Only treatment given was sterile dressing to external wounds and mentholated oil to larynx.

Case VI. E. H., Pvt., 177th Heavy Artillery, French Army. Perforating wound of larynx by shell fragment October 23, 1917, with abductor paralysis right cord, which had entirely cleared up by March, 1918. No untoward symptoms or voice alteration noticed after that lapse of time. As this patient had other severe wounds, he was under observation until February, 1919, when our hospital closed. Larynx at that date apparently normal.

Case VII. F. J., Pvt., Co. M, 370th Inf. G.S.W. "O" "IA" right side of neck at level of larynx, September, 1918. Had adductor paresis of right vocal cord on admission with some inflammation of laryngeal mucous membrane. Cleared up in about ten days.

Case VIII. R. Mc., Cpl., 5th Marines. G.S.W. "S" "IA" multiple by shell fragments, one of which traversed larynx just below cords, November 1, 1918. No treatment to laryngeal wound except debridement of wound of exit and sterile dressing. Slight aphonia at time of admission. Evacuated January 30, 1919, larynx apparently normal.

Case IX. G. E., Mare Chal-des-Logis of 37th French Artillery. G.S.W. "S" "IA" by shell fragments, multiple, one of which traversed larynx, July 5, 1918, near Chateau Thierry. Patient received by us July 17, 1918, with laryngeal wound practically healed. No symptoms from laryngeal wound aside from aphonia and slight dysphagia. Other head wounds were severe, but larynx apparently normal one month after injury.

Case X. U. S. R., Pvt., Co. G, 109 Inf. G.S.W. "S" "IA" by shell fragments, one of which traversed the larynx October, 1918. Aphonia and slight dyspnea were the only symptoms. Patient only kept a few days, but larynx almost normal on evacuation.

Case XI. L. S., Co. D, 128th Inf. G.S.W. "O" "IA" multiple, of head and neck, one fragment of which was removed from right of thyroid cartilage. Adductor paralysis of right cord, which cleared up in a very few days.

Case XII. B.A.F. G.S.W. "S" "IA" multiple, by shell fragments, Sept. 16, 1918, one fragment of which had traversed larynx. Wound of exit still suppurating. Aphonia and dyspnea. Adductor paralysis right vocal cord.

The latter cases are typical of most of the injuries seen by us. We were surprised that they recovered so rapidly and with so little after effects in the short time that they were under our observation. The tracheotomy tube was resorted to only in cases of severe dyspnea. We were called upon several times to do tracheotomies for relief of dyspnea due to inflammation or cellulitis secondary to wounds of the neck when the larynx itself was not directly involved in the primary injury.

An examination of the other cases in detail would serve no useful purpose, as the latter are typical of the majority of them, and records to which we now have access are very meagre. We had no fatalities from larynx injuries. This was probably due to the fact that we were so far removed from the battle front. Captain Harmer of the British service, shows that the mortality from these wounds was greater in the advanced areas than back. We served either as an evacuation or a Base Hospital.

One case of interest was H. B., of a French infantry regiment, who had received multiple shell fragment injuries near Verdun in February, 1916. A small fragment of shell evidently traversed the larynx from in front and lodged in or near the body of the sixth cervical vertebra. Nothing was done for the laryngeal wound, as he had several other very serious injuries. In March, 1918, which was two years after his injury, he developed a retro-pharyngeal abscess which we opened to one side rather low and evacuated a small amount of pus. This healed over and about a month later he developed a second retro-pharyngeal abscess which ruptured spontaneously in midline at about the level of the end of the epiglottis. From this opening pus and caseous material were evacuated for several days. Several small fragments of dead bone and the shell fragment came through this opening. The larynx was normal in appearance and function. Treatment was a collar to furnish support on account of the caries of the vertebrae.

Quoting from Dr. W. Douglas Harmer of the British Medical Service, in an analysis of 245 cases, he calls special attention to the frequency of paralysis of the vocal cords, following gun shot wounds of the neck. Appearing immediately after the wound, it is generally abductor in type in the early stages. There is little doubt in Hamer's mind that shock is chiefly responsible for the following reasons: (1) The large number of cases reported; (2) Paralysis of other cervical nerves (excluding brachial plexus) are comparatively rare; (3) Other nerves are known to be paralyzed by shock; (4) Paralysis of the recurrent laryngeal has occurred several times after ligature of carotid aneurysms, and is well known in other operations on the neck; (5) Paralysis of the brachial plexus is common after wounds of the neck and all its trunks are generally involved rather than one, as would occur if a direct injury were responsible.

In regard to the type of vocal cord paralysis we saw, the adductor was more than twice as frequent as the abductor. That is, the paralyzed cord stood in abduction and would not adduct or move to the median line.

Again quoting from Captain Harmer's paper: "The mortality from wounds of the larynx is high. In 512 cases, mostly treated in France, there were 31 deaths and two of these men had received injuries of the larynx. On the other hand, 1873 neck wounds were treated in British hospitals during the same period with only 17 deaths. Of these, 110 men received injuries to the larynx and only one died. These figures prove that the mortality is much greater at the front than at the base. In two-thirds of the men with gun shot wounds of the larynx who survive more than a week, recovery is complete and no ill effects are produced beyond alteration of the voice. This latter statement, we believe to be true, in so far as we were able to follow our cases. Professor Körner says practically the same in commenting on his cases."

Harmer also cites that wounds of the larynx are infinitely more rare than wounds of the jaws; that transverse wounds of the larynx are more common (61) than oblique (24); that entry wounds in the middle line in front are very rare (8); and never occur posteriorly, doubtless because the spine is always involved with fatal results.

In summing up, from the small number of cases which came under our observation, the most of which came to us a week or later after their injury, we were surprised at the mildness of the symptoms and distress and the rapid manner in which repair and amelioration of

symptoms came about. We saw no fatalities from wounds of the larynx and in all cases, an audible voice returned as soon as the external wounds were closed. It will be interesting to hear a later report of these cases. One of our cases who lives in Omaha and who had a simple transverse perforating wound of the larynx has no symptoms whatever two years after his injury.

FIVE CASE REPORTS APPENDED FROM CLINIC OF DR. C. JACKSON.

Case I. Private, aged 25 years. Nov. 18, 1918, incised wound in thyro-hyoid membrane. Tracheotomy tube inserted through wound into larynx. Later a high tracheotomy was done. Referred for decannulation. Treatment: Low tracheotomy and dilatation of stenosed larynx. Improving steadily. Prognosis as to decannulation excellent.

Case II. Private, aged 21 years. October 23, 1917, was caught between the automatic folding doors of a powder elevator or hoist on the Battleship "Michigan." Both arms and the neck, front and back, received the brunt of the force. Was unconscious for ten minutes. Tracheotomy became necessary later in the same day. Tracheotomy tube removed November 4, 1917, and reinserted November 18, 1917. Referred for treatment of laryngeal stenosis. Low tracheotomy done. Laryngeal dilatation being carried out. Too much destruction of cartilage to warrant laryngostomy. Voice good. Prognosis as to decannulation poor.

Case III. Private, aged 22 years old. June, 1918, while in service in France, received gunshot wound in the neck, entering the right side of neck and coming out the left shoulder. Breathing became gradually worse until four days after the accident tracheotomy became necessary. Performed June 11, 1918. Resection of posterior half of larynx. Voice is rough, but loud, and is produced by folds of cicatricial tissue. Breathing space is being increased by dilatation of cicatricial tissue orifice. Will always require canula. But breathes through mouth with canula corked.

Case IV. Private, aged 25 years. Gassed with mustard gas on June 14, 1918, at Chateau Thierry, France. Lost voice after accident for six weeks. Dyspnea started immediately, accompanied by profound asthenia. Dyspnea gradually increased. Tracheotomy performed June 11, 1920. Patient much relieved by tracheotomy, but on the 15th of July there occurred some sudden interference with respiration which patient describes as "it seemed as though the lung would not expand." Patient became very cyanotic, extremely

dyspneic and asthenic. Referred to Chevalier Jackson. Left pneumothorax found. Extreme emphysema. Cicatricial web stenosis of trachea leaving a 5 millimeter opening was completely cured. Patient recovered from pneumothorax only to succumb from a purulent bronchitis initiated by an acute infection engrafted upon a chronic bronchitis, the result of the war gas exposure.

Case V. Private, aged 30 years. June 5, 1918, while in service in France, was wounded in the neck by the premature explosion of a hand grenade. Tracheotomy was done immediately for breathing and gastrostomy performed the day after the accident. Severed trachea and esophagus were sutured and healed kindly. Has had a hemilaryngectomy. Decannulation not advisable. Swallows well. Breathes through mouth with canula corked. General physical condition fair.

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VALUE OF DIRECT INSPECTION IN THE DIAGNOSIS OF CHRONIC MAXILLARY SINUS DISEASE.*

DR. F. L. DENNIS AND DR. W. V. MULLIN, Colorado Springs, Colo.

There will be no dissension from the opinion that, aside from any consideration of the comfort of, or danger to the patient, direct inspection of a cavity offers the surest means of determining its condition. The question at issue, however, is, granting this advantage, is it justifiable to make this inspection, involving as it does an operative procedure, in every case of suspected chronic disease of the antrum of Highmore?

We say "suspected" because when disease of the antrum is evident, naturally no exploration is needed to clear up the diagnosis. In THE LARYNGOSCOPE for May, 1921, Emerson says, "In every case of long standing polypoid degeneration of the ethmoid labyrinth, operative interference should be followed by inspection of the antrum on that side." He also refers to the presence of gelatinous masses in the antrum, which we have frequently noted in these polypoid cases accompanying asthma. He thinks many of these cases with indefinite symptoms have been over-looked.

We believe that such inspection is justifiable, for the following reasons:

a. The operation through the canine fossa is a relatively simple procedure, can be carried out under local anaesthesia, and is free from danger.

b. The information obtained is positive, whereas, irrigation through the natural opening or by puncture through the inferior meatus leaves one absolutely in doubt, if it be negative in result. If pus is obtained by irrigation we have learned only that pus is present in the antrum, but have obtained no information, except by inference, as to the actual pathological condition of the interior of the cavity. Further, it has been abundantly shown that puncture of the antrum is not infrequently accompanied by unpleasant—even disastrous—results.

c. In those cases of antral disease in which pus formation is absent or minimal in amount, or is intermittently present, and in which the pathology is represented by hyperplastic or polypoid changes, the deductions from test irrigations are utterly misleading.

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*Read at the meeting of the Colorado Congress of Ophthalmology and Oto-Laryngology, Denver, August 5 and 6, 1921.

d. If pus be present, direct inspection is still necessary to ascertain the actual condition of the lining membrane and bony wall.

It is necessary in most of these cases—particularly the non-suppurative ones—to inspect every angle of the sinus. Often the diseased mucosa is limited to isolated areas, with healthy membrane intervening. Nothing less than a complete inspection of every nook and corner suffices to bring these areas to light.

The advantages of local anaesthesia in opening the antrum through the canine fossa are so marked that it would seem to be the method of choice in practically every case. We were led to adopt this procedure in a case of severe asthma, complicated by bronchiectasis, in which a general anaesthetic would have been positively dangerous. We were so much pleased with the result that it has been used in every case since. The anaesthesia is excellent, the bleeding is practically nil, and a perfect view of the antrum is obtained. The patient is spared the discomfort and dangers of ether, and leaves the table in a much more satisfactory condition than when a general anesthetic is used.

This method is of particular value in asthmatic, bronchiectatic, and tubercular cases. These cases stand ether badly; a large proportion of them have sinus involvement, which is usually multiple; and, not infrequently, the pathological condition is not one of suppuration, but of polypoid degeneration or other hyperplastic changes in the lining of the cavities.

The sinus disease is often accompanied by a gelatinous exudate, filling the cavities, and appearing in the nasal fossae. It is manifestly impossible in such a case to diagnose the condition by puncture, lavage, or even opening through the inferior meatus.

Let us suppose a case of polypoid degeneration involving the ethmoid labyrinth. The probabilities are that the sphenoid as well as the antrum are similarly affected. By means of this procedure, the condition of the interior of the antrum is definitely known and besides, through enlarging the natural ostium, excellent access to the upper nasal cells is obtained.

In cases of bronchial asthma of definite nasal origin it is imperative that every vestige of infection be eliminated. A cloudiness of the maxillaries *may* be shown by X-ray and trans-illumination may or may not be negative; if no actual pus but only polypoid degeneration be present, puncture and irrigation will yield clear fluid. In these cases inspection by means of exploratory operation is justified.

Performed under local anaesthesia, the operation is not more formidable nor more painful than the infra-turbinal route, and permits not only of complete inspection, but of exact application of any remedial measures, such as currettage, which may be indicated.

An article appearing in the March number of The Anals of Otology, Rhinology, and Laryngology, by Theobald, describes an operation done intra-nasally, which comprises the removal of the pyriform crest and the anterior wall of the antrum. He extols the advantages of this method of operating. It is difficult to understand how every particle of the cavity may be seen through the necessarily small opening made in this operation. It occurs to us that the approach through the canine fossa would offer a much simpler and easier method, and at the same time afford a very much clearer view of the entire cavity.

Technique. The technique is very simple. Complete anesthesia is obtained by the following method:

a. The middle and inferior meatuses are packed with strips of cotton saturated in a solution of equal parts of 10 per cent cocain and 1/1000 adrenalin.

b. The canine fossa and gingivolabial fold are infiltrated subperiostially with 1 per cent novocain to which has been added two drops of adrenalin to the drachm.

c. Immediately after finishing the injection the usual Caldwell-Luc incision is made and an opening chiseled through the canine fossa where the wall is thin. Inspection is made through this opening.

d. A strip of gauze saturated in the cocain-adrenalin solution is packed into the antrum, filling it completely, and left for five minutes. During this five minutes, if it has been determined from the inspection already made, that it is desirable to make a counter opening in the inferior meatus, a submucous elevation, through the nostril, of the nasal side of the naso-antral wall underneath the inferior turbinate is done.

e. On removing the packing from the antrum the lining will be found anaesthetized and free from blood, and a perfect view of the whole cavity is obtained. The bone opening is now enlarged as much as necessary in every direction, avoiding too close proximity to the infra-orbital canal. In looking for diseased areas especial attention is directed to the angle between floor and anterior wall; anterior and external walls and the angle formed by the anterior wall, floor and nasal wall, where it will not infrequently be found

that the antral cavity extends below and in front of the floor of the nose.

Anatomists are fairly well agreed that the floor of the antrum is usually below the floor of the nose; therefore, the location of the counter opening into the nose should make but little difference and one should be guided in this part of the technique by each individual case. The inferior turbinate should be preserved in all cases. Further steps in the operation depend on the findings.

If no disease is present, the opening is saturated with chromic gut, either a continuous or interrupted suture. If pus is present as much of the mucous lining is removed as is diseased, and after removing the bone of the naso-antral wall of the inferior meatus the flap is turned in.

In the hyperplastic cases with polyp formation involving the region of the ostium and the ethmoid cells, we prefer to enlarge the natural opening and remove the disease in the ethmoid through this opening.

Swelling of the face following the operation will differ in different individuals as evidenced by one case where both antra were operated upon with an interval of three weeks between. The right side had practically no swelling, the left considerable. Cold applications or lead water and opium will control it.

The average hospitalization of these cases after local anaesthesia is two and one-half days, while under ether it averages one week.

No packing is used and very little irrigation other than nasal douching is carried out.

301 Ferguson Building.

TWO CASES OF INFECTION BY B. PROTEUS.*

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The following two cases are of interest on account of the character of the infecting organism. When I reported the case of lateral sinus thrombosis, I thought it possible that B. proteus was the original cause of the infection and the only organism involved. When I learned that it had also been recovered in the case of peritonsillar abscess terminating fatally, I came to the conclusion that it had been a terminal infection in both cases.

CASE OF CAVERNOUS SINUS THROMBOSIS SECONDARY TO PERITONSILLAR ABSCESS.

Carmelo Damico. Age 18. Autopsy 9068. Ward XI. Admitted October 15, 1920. Died October 16, 1920. Five hours P. M. History 47728. Dr. von Glahn.

CLINICAL HISTORY.

Chief Complaint: Swelling on the left side of the neck and face. painful left side of body. Delirious for the past five days.

Family and Past History: Not obtained.

Present Illness: Twenty days ago patient had fever and sore throat. After four days he had an abscess in his throat on the left side incised. Two days afterwards his neck began to swell externally on the left side. Eight days after his first operation his tonsil was again incised, at which time he bled profusely. After a slight improvement of two days' duration his right eye began to swell. He had fever, sore throat, severe headache—especially at night, diarrhœa, anorexia, polydipsia, and noise in his ears. Five days ago he developed cough, pain in left side and has been delirious since then.

Physical Examination: A young man, delirious. Skin, jaundiced. Tenderness along the left side of head behind mastoid. Marked swelling of both lids of the right eye. Edema of lateral half of conjunctiva. No actual bulging of the eye. Movements and reflexes O. K. Jaws open with difficulty. Tongue coated and apparently swollen. Left tonsil swollen and has a gray membrane in spots. Scar on left palate. Pharynx congested. Neck rather rigid, perhaps on account of swelling of whole left side below angle of jaws. Swelling is firm, tender, but not red. Lungs: rales both bases. Slightly tubular breathing inside of right scapula. Heart: rapid, regular, not enlarged; systolic blow at apex, followed by

*Read before the New York Academy of Medicine, December 21, 1921.

musical late systolic. Some liver tenderness; liver enlarged. Spleen just palpable. Left leg rather spastic. Double exhaustible ankle clonus, more marked on left. White blood count: 15,500. Polys. 86 per cent. Ears: right—redness along malleus, Shrapnell's membrane bulging and red; left—normal. Eyes: right disc sharply marked, veins dilated, vessels tortuous.

Course: Seen by aurist, who gave bad prognosis, and advised merely expectant treatment. The next day condition was much worse, patient was in coma. Two red spots appeared on hand, and yellow plaque on dorsum of right foot. Patient died in coma.

Clinical Diagnosis: Septicemia. Peritonsillar abscess. Cervical adenitis.

—Anatomical Diagnosis: Peritonsillar abscess—left. Infected thrombus—left jugular vein, extending to petrosal, cavernous, circular sinuses and ophthalmic veins; acute purulent meningitis; abscess of left temporal lobe; lobular pneumonia—both lower lobes; fibrinous pleurisy—right; abscess—left lower lobe; acute splenic tumor; jaundice; chronic cardiac valvular disease—mitral; hydroureter—bilateral.

Museum Specimen: Organs of neck, lung, spleen.

Autopsy: The essential part of the autopsy for the purposes of our report is the examination of the tonsil and the brain.

Left Tonsil: Is not enlarged. It is quite gray and contains numerous deep crypts. The uvula is very edematous.

Below the left sternocleidomastoid muscle and extending upward anteriorly to the ear, then over the angle of the jaw and forward to the facial artery, and also below the mandible, is a large pocket which contains only a small amount of chocolate,colored fluid, and whose walls are covered with a reddish brown exudate. The glands of the neck near this pocket are very edematous and on section appear hyperemic. The jugular vein passes through this mass of large glands and forms part of the wall of the abscess cavity. Its lumen is filled in this portion with thrombus, which has undergone softening. The thrombus extends upward into the left great petrosal sinus, the left inferior petrosal sinus, and for a short distance into the left sigmoid and left lateral sinuses. The petrosal sinuses on the left, both cavernous sinuses and circular sinuses, as well as both ophthalmic veins, are filled with greenish yellow pus. The posterior orbital tissues, particularly of the right eye, are edematous.

Brain: On the base of the brain, more marked on the left half, and extending up into the Sylvian fissure and over the tip of the temporal lobe, there is a thick, purulent exudate. The tip of the

temporal lobe feels somewhat softened. Over the pons and medulla there is a subpial hemorrhage which is quite fresh, but which seems to be the result of an occipital puncture done immediately after death of the patient in an attempt to obtain spinal fluid. Hypophysis is very much injected and is covered with an acute inflammatory exudate.

Middle ears upon exploration found to be negative. Sphenoidal sinus full of thick, muco-purulent material.

MICROSCOPIC EXAMINATION.

Left Tonsil: In a few of the crypts, there is some cellular debris and leucocytes. The epithelium is negative. In places there is some oedema of the lymphoid tissue and the vessels are injected, and in places there is some hemorrhage. There is no infiltration with leucocytes. The follicles are prominent. The capsule contains many mononuclear cells, usually in clumps. The muscle is cedematous and upon it is a thick layer of granulation tissue infiltrated with small wandering cells and a few leucocytes. This is the wall of the abscess cavity.

Sinuses: In all of the sections from the sinuses, the changes are the same. There is a thick layer of leucocytes with some fibrin upon the inner surface, and large masses of bacteria are seen. The central portion of the exudate has softened and fallen out. The wall of the sinus is oedematous and there is marked injection of the surrounding vessels with occasionally some hemorrhage. In one section of sinus a bit of thrombus is found.

Hypophysis: There is a thick fibrino-purulent exudate upon the surface and the capsule is injected.

Brain: The sections are through the left temporal lobe. A. There is an acute inflammatory reaction in the pia. In one portion the exudate and neorosis extends down into the white matter with a diffuse infiltration of the latter with leucocytes. B. Similar to A.

Lymph Glands: The sections are from the cervical glands close to the abscess. A. There is injection of the vessels and some oedema. The follicles are not prominent. The sinuses contain chiefly lymphocytes. B. The vessels are injected and there is some hemorrhage. The sinuses contain blood.

Heart: Does not show any changes.

Aorta: Negative.

Lung: A. There is some rupture of the interalveolar septa. Many of the bronchi contain an acute exudate, and groups of alveoli are full of leucocytes; others leucocytes and blood. B. From the right lower lobe. The alveoli are partially compressed and there is in-

jection of the vessels of the septa. The bronchi are full of leucocytes and the alveoli contain leucocytes and blood. C. From the left lower lobe. There is a large necrotic area surrounded by leucocytes. The alveoli in this neighborhood are compressed and full of blood; those at a distance contain serum, leucocytes and blood. There is a thin layer of fibrin on the pleura over the abscess.

Spleen: There is considerable blood in the vanules. The pulp contains many leucocytes. The Malpighian bodies are quite small. No increase in fibrous tissue.

Adrenal: Negative.

Kidney: The glomeruli do not show any changes. There is a granular precipitate between the tuft and capsule, and also in the tubules. No increase in interstitial tissue nor any round cell infiltration.

Prostate: Afew corpora amylacea are seen. There is nothing abnormal made out.

Testis: The interstitial tissue is increased and the basement membrane is slightly thickened. The tubules contain only Serteli cells and spermatogenia. No spermatozoa.

Skin: From the dorsum of right foot. About some of the capillaries in the corium are seen a few leucocytes.

Thymus: Hassel's corpuscles are large and numerous. There are wide connective tissue septa between the lobules and abundant connective tissue within some of the lobules.

Liver: Negative.

Gram Stains: Tonsil: There are seen on the surface of the granulation tissue of the abscess wall, very short Gram negative bacilli; also a few larger Gram negative bacilli. Sinuses: Very short Gram negative bacilli in great numbers. Brain: Abscess left temporal lobe. There are a few Gram negative bacilli.

Final Note: Salient points in the case are a history of possible trauma unverified, followed by peritonsillar infection requiring two incisions. Presumable there was an extension of this tonsillar infection to the deep tissues of the neck and to the jugular vein, extending later to the intracranial sinuses, meninges and the left temporal lobe. At the time of autopsy, the wound of the tonsillar incision was apparently healed and sections show only a peritonsil inflammation. The only organism recovered was the B. proteus.

CASE OF LATERAL SINUS THROMBOSIS WITH BACILLUS PROTEUS IN BLOOD CULTURE IN THE THROMBOSIS.

Cases of lateral sinus thrombosis, in which the infecting organism is the B. proteus, are of such rarity as to make the following case

of interest. I have been able to find but two instances of this infection mentioned in the literature, although my search was fairly exhaustive. In neither of these instances were the details of the sickness given, so I am unable to judge how characteristic the symptoms I am about to relate may be.

James H., age 36, was admitted to the Presbyterian Hospital, November 3, 1921. He gave a history of sudden onset of headache and indigestion four weeks before admission. He went to bed at once and was confined to bed up to the time of his coming to the hospital. His symptoms were those of severe sepsis—chills, fever, sweating, at times accompanied by delirium. He lost thirty pounds. He had no cough nor pain in his chest. For the four days before his admission he had dyspnoea.

Of significance in his past history was the fact that he had had a discharging right ear for seven years. There was no exacerbation of the ear symptoms at the beginning of the illness which brought him to the hospital. When taken sick he was having neuralgia in his teeth, and after three weeks of illness he had a tooth pulled.

Physical Examination: The general appearance was that of an extremely ill white man, hot, and very dyspnoeic. The skin and sclerae were slight jaundiced. Head: No tenderness. Ears: Thick white discharge in the right canal. Eyes: Petechiae in both lower lids. No strabismus nor nystagmus. Veins of the retinae markedly engorged and twisted. Discs not choked, though the right appeared a little red and the outer margin blurred. Neck: Held stiff. There was a soft swelling over the upper part of the right sterno-mastoid muscle; no fluctuation nor tenderness. Rest of the physical examination was negative.

The following note was made of the condition of the right ear late that night:

The right drum membrane is totally destroyed. A small remnant of the malleus can be seen at the upper circumference of the tympanic ring. The mucous membrane of the tympanus has been replaced by granulation tissue.

The swelling in the upper part of the sterno-mastoid region with enlargement of the glands and stiffness of the neck suggests sinus thrombosis as the primary cause of a fully developed septicaemia.

Laboratory Data: Widal.—Negative. Blood Wassermann, weak-positive. Blood culture—B. proteus.

Blood count. Haemaglobin 85 per cent. Red cells, 4,768,000; white cells, 25,500.

Differential—Polynuclear, 78 per cent; lymphocytes, 21; eosinophiles, 1 per cent.

Spinal puncture. 20 cc. fluid under slight pressure. Culture negative. 12 cells. Test for globulin negative.

The man seemed so ill at the time of the first examination that advice was given to leave him alone. By the next morning he appeared to have rallied somewhat, and after consultation with Dr. Coakley, an operation was decided upon. The same afternoon a simple mastoidectomy was done. The cortex was thick and very hard, as was to be expected. The antrum, considerably enlarged, was a smooth walled cavity occupied by a cholesteatoma. The bone over the sinus was necrotic and over the sinus was found a large epidural abscess which extended well down toward the bulb and back toward the torcular. This abscess consisted of very foul greenish pus. As the soft tissues over the tip of the mastoid process were separated from the bone a large abscess cavity was opened, which extended down beneath the sternomastoid muscle almost to the clavicle. This contained the same peculiar foul pus. Bone was removed till healthy dura was reached. The sinus was followed back till free bleeding was encountered from the proximal end. No bleeding came from the distal end near the bulb. All the foul clots were turned out of the opened sinus.

The work in the mastoid region being completed, the jugular vein was exposed and tied through an incision in the neck, as was also the facial vein. All the wounds were left widely open and packed. The patient received a transfusion of salt solution on the table, and soon after his return to bed a transfusion of 500 cc. of blood.

The reaction to the operation was surprisingly favorable. The next day the patient was stronger and more comfortable. He was again given a transfusion of 500 cc. of blood. The favorable reaction proved only temporary. That night he again had a chill, and there after this was a daily occurrence. On the sixth day, on account of bleeding from the wound, he was given an anesthetic, and the wound was thoroughly explored. The source of the hemorrhage was found to be a superficial vein. The infection did not appear to have extended toward the torcular, or over the dura, but the whole wound area was exceedingly foul, large masses of slough coming away.

Thereafter the course was increasingly unfavorable, till death occurred on the tenth day after operation. The treatment, aside from the care of the wound, consisted of another transfusion, an infusion of 3 per cent glucose solution, and the use of proper heart

stimulants. The blood cultures continued to show B. proteus up to the day of death. Unfortunately no autopsy could be obtained.

There are a number of points of interest in connection with this case. In the first place, the infecting organism, the B. proteus, is usually considered to be of low virulence. I have seen it stated that the only organism ever causing lateral sinus thrombosis is the streptococcus. The B. proteus may appear in the blood at the end of an exhausting illness by invasion from the intestine. The fact, however, that in this case it was found in the cultures from the epidural abscess would lead one to suppose that it was the primary cause of the whole trouble. We may suppose that its presence in the middle ear was due to the long persistence of the otitis media, it having been a secondary invader after the original germ had died out. The character of the pus, green and exceedingly foul, was characteristic.

The thought suggested is this: In cases of lateral sinus thrombosis, secondary to otitis media chronica, may we expect to find an occasional case caused by such organisms as B. proteus and B. pyocyaneus, whereas all the cases following acute otitis media are caused by the streptococcus. In the second place, as to the operative treatment. Ordinarily one would have done a radical operation in a case like this. Such was the poor condition of the patient, however, that the saving of time was very essential. So only a simple mastoidectomy was done, with proper treatment of the sinus and ligation of the jugular vein. In spite of these measures the blood cultures continued positive. Was this because there was another source of infection, or was it due to multiplication of the germs already in the blood? No other source could be found at either of the two operations, nor by repeated physical examinations. Only an autopsy could definitely have solved this question and, as before stated, this was not obtained.

November 4, 1920, Transfusion 500 cc. November 6, Weakness of right corner of mouth. November 6, Bleeding. November 7, Transfusion 500 cc. November 9, Transfusion 500 cc. November 4, Cultures from mastoid wound B. proteus. November 8, Dressing soaked with brownish, foul, purulent discharge. November 11, 1000 cc. 10 per cent glucose solution intravenously. November 12, Blood culture B. proteus. Urine negative.

Course of temperature: 102° plus on admission. Ran from 100° to 104°. Pulse ranged from 140 to 160.

156 East 79th St.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

November 1, 1921.

A stated meeting of the Philadelphia Laryngological Society was held on Tuesday, November 1, 1921, in Cadwalader Hall, College of Physicians, at 8:15 P. M.

Dr. Francis P. Emerson read a paper entitled "Indications for Opening the Mastoid Cortex."

DISCUSSION.

We have all listened to Dr. Emerson's paper with a good deal of interest. I can agree with everything he has said. He could have said much more had he had the time. This leaves some room for further discussion of the subject. Speaking of the small teat-like perforation, I believe Dr. Emerson referred also to the fact that the secretion in such cases tends to pulsate. Whenever a perforation of the tympanic membrane is small and tends to pout out, forming a nipple-like opening it speaks for a condition of inflammatory edema of the mucous membrane of the tympanic cavity. The edema is so pronounced that there is insufficient room for the swelling, and the swollen membrane protrudes through the perforation. That is a symptom that calls for operation. Sagging of the posterior wall of the osseous canal is due to a periostitis of the external corticalis of the mastoid which follows in every case of suppuration of the mastoid cells. Slight swelling of the upper posterior canal wall may be overlooked. However, if one bears in mind that normally the upper posterior wall of the osseous canal is continuous with the upper posterior half of the tympanic membrane there follows in the case of periostitic swelling of the upper posterior wall of the canal at its junction with the membrane that there must be a sharp angle instead of a continuous smooth line at this juncture. Even in those cases where there is no external swelling over the mastoid, this sign will be present. It is the easiest thing to detect after having once observed it. Tenderness over the tip of the mastoid: In reference to this sign I would like to say that there are quite a few atypical cases which will show very little or no tenderness. We have had cases with marked intracranial complications following mastoiditis where there was no tenderness at all on the mastoid.

Persistence of discharge: The Politzer School used to claim that in any case where an acute middle ear suppuration tended to discharge beyond a certain length of time in spite of careful conservative treatment, it was a clear indication for an operation on the mastoid. A reasonable time in the Politzer School was considered to be about six weeks. Since then (fifteen or twenty years later) the time limit calling for surgical intervention has been shortened, until now if a case does not show improvement within one or two weeks, and especially where there is any undue discomfort, the case is considered complicated and should be operated. I am inclined to accept and do accept Dr. Emerson's conclusions. Sometimes patients will have a mastoiditis with so few symptoms that one hesitates to operate. If one does not operate in acute mastoid disease it does not mean that the patient must die, for many of them run into a chronic mastoiditis.

How do we recognize the chronic mastoiditis? All cases of chronic middle ear suppuration that come to operation eventually show by the presence of sclerotic mastoid and granulations, that there must have been a chronic infection in the mastoid cells. In all cases of chronic middle ear suppuration the patient should be kept under observation for any untoward symptoms.

Reinfection from the nasopharynx: In this event one must believe that the middle ear infection came from an obstructive disease or infection of the nasopharynx. It is up to the oto-laryngologist to see that they are corrected.

Dr. Emerson made mention of the streptococcus mucosa. I would like to cite the first case I saw of the kind. This was a case where the patient was sent from the Neurological Department to the Oto-Laryngological Department of a large European hospital in a condition of semicoma, with occasional convulsions, a high temperature and pulse rate. The history revealed that a week before the patient had a tonsilitis and a few days after earache, and nothing more. Otoscopic examination revealed the right tympanic membrane to be dull and rather opaque, The membrane presented a waxy appearance indicating that there was secretion behind it. There was no redness or swelling of the drumhead. The other side was normal. The streptococcus mucosa was recovered from the secretions obtained by paracentesis. An operation was planned for but the patient died in the meantime (two hours later). Postmortem examination showed a considerable amount of pus in the subarachnoid space, establishing the diagnosis of purulent meningitis. Speaking of the streptococcus mucosa infection, I might add that they follow more often infection of the tonsils than infection higher up in the nasopharynx. The earache is not extremely intense. The inflammation, however, tends to travel backward, without producing many symptoms; and while traveling backward there is apparent healing in iits wake. It is therefore one of the most treacherous infections that we have to deal with.

High temperature, headache and facial palsy are important indications for operation.

In closing the discussion of a paper on the subject of, "Some Remarks on the Weber, Schwabach and Rinne Tests," presented before the Academy of Ophthalmology and Oto-Laryngology at its last meeting in Philadelphia, I made reference to what I have termed the Weber-Schwabach paradox and its significance.

In the case of obstructive disease—for instance, middle ear catarrah, the Weber is referred to the affected side in the case of a unilateral lesion and to the worse hearing side in the case of bilateral lesions; and at the same time the bone conduction is better (longer) than normal on the affected side in the case of unilateral lesion, and longer on the worse-hearing side in the case of bilateral lesions so long as the inner ear remains unaffected.

In the case of obstructive disease, pure and simple, the combination of Weber to the worse hearing side with greater lengthening of bone conduction on the same side are consistent findings. It, however, happens now and then that this consistence is lacking. For instance, a patient with impairment of hearing, let us say of the right side, because of a middle ear *suppuration*, with a normal left ear, reveals the Weber distinctly referred to the right ear, even when the fork is carried several inches to the left of the midline of the skull; but when the fork is applied to the mastoid in taking the so-called Schwabach, instead of finding the bone conduction longer on the right than on the left it is found to be shorter. Surely this is paradoxical. This is an observation that has been made by others, and not finding any explanation for it they arrived at the conclusion that the Weber was deceptive and, therefore, an unreliable test, not to be depended upon. I have observed the same lack of consistency of these two tests every now and then, and as a result felt as skeptical as others did about the value of the Weber test. More recently I found an explanation for the paradox that seems entirely reasonable, and have confirmed it in those cases in which opportunity was afforded.

I believe that the Weber-Schwabach paradox will eventually prove to be an important sign of mastoiditis. In the case of mastoiditis with ex-

ternal thickening of the soft parts, and tenderness, the Schwabach could hardly be expected to be as long as in those cases where there is no external thickening, because the thickening of the soft tissues would tend to act as a cushion, inhibiting thereby the transmission of sound waves. Again the coincident tenderness prompts the examiner to use a little less pressure with the tip of the fork handle than in the average case without tenderness. This is not the kind of case I refer to; besides the presence of an external periostitis is sufficient evidence of mastoiditis to make the paradox an unessential additional sign. The cases of mastoiditis where the paradox may be of greatest value are those in which there is practically no gross external evidence; namely, those in which there is no external swelling or tenderness over the mastoid.

In the case of mastoiditis where there is softening of the bony trabeculae, granulation tissue and pus within the mastoid spaces including the antrum, the sound waves do not reach the auditory apparatus as readily by the mastoid route as in the cases with a normal mastoid. This hindrance tends to shorten the bone conduction via the mastoid; more so than by the route from the midline of the skull as occurs when making the Weber test.

In making the tests it is important to use the stop-watch and time the Weber as well as the Schwabach. The detailed citation of a single case will bring out the essential features of the paradox.

A young woman under suspicion of a mild grade of mastoid empyema on the right side, and with a normal hearing left ear, revealed the Weber strongly lateralized to the right side, even when the fork was placed four inches to the left side of the midline of the skull. Furthermore, the Weber was lengthened thirty seconds; accordingly, the Schwabach was anticipated to be lengthened on the right side approximately thirty seconds. Instead it was found to be normal to slightly short of normal on repeated tests. The diagnosis of matoiditis was made from these findings and confirmed at operation.

Lest someone might think that I wish to limit the interpretation of the paradox to the above character of findings only, I desire to call attention to the fact that it may manifest itself in several forms. Occasionally the Schwabach may be normal when lateralization and increased length of the Weber would suggest a lengthening of the Schwabach. Again, the Schwabach may be found to be lengthened but considerably less so than might be expected from the character of the Weber.

I would like to close my discussion with a brief reference to two of Alexander's axioms: (1) In a case of doubt, it is safer to operate than not. The same author claims that in 85 per cent of the cases where one merely suspects a pus infection to be present at the time of the operation, pus will be found. (2) The fatilities that occur in spite of operation never result from doing too much, but always from not doing enough.

DR. GEORGE W. MACKENZIE: I wish to answer Dr. Shuster's question. I believe Dr. Shuster has the impression that the explanation of the paradox is due to the fact that a patient with a chronic middle ear suppuration can develop secondarily an internal ear condition. This does occur in some cases but it is not the character of the case that I am referring to. The shortening of the Schwabach in the case that I am speaking of is due to the presence of granulation tissue and secretion in the mastoid cells that interferes with the conduction of sound waves to the inner ear, by the mastoid route.

DR. S. MACCUEN SMITH: It has been my pleasure to know Dr. Emerson and his work rather intimately longer, perhaps, than most of you. I was prepared, therefore, to hear the excellent paper just read. All I shall attempt will be to emphasize some well-made points in his paper. First, I should like to ask Dr. Emerson whether he would not approve

of the elimination of the word "paracentesis" from otologic literature, as it means literally a puncture of the membrana tympani, which would seldom effectually drain the tympanic cavity. Incision or myringotomy could be substituted and would actually define the procedure as it is, or should be done. It is our custom to aspirate the tympanic cavity following myringotomy. This not only relieves the cavity of its secretion, but the mucosal lining as well of a considerable amount of congestion.

We are all familiar with the fact that certain well-defined cases of acute mastoidities will themselves effect a spontaneous cure, owing to the fact, perhaps, that an occluded aditus becomes patulous, so that in the absence of urgent symptoms it is frequently desirable to wait for a time, or until the walling-off process has become established. In the presence of urgent symptoms, however, we should not unnecessarily delay, as the mastoid operation is a very simple procedure compared with the complications that may arise incident to its postponement. Furthermore, a timely operation will greatly aid in the restoration of the hearing, and, by the arrest of the pathologic process, prevent a chronic otorrhea.

Although temperature, and also tenderness over the process, are two of our most constant symptoms, yet if the drainage is free the temperature may be almost normal, whereas if the cortex is hard and eburnated there may be no tenderness over the process. In cases of this type, the carious erosion will follow the line of least resistance and is likely to invade, by one of the numerous paths, the interior of the skull. It is not unusual, in such cases, for the attending physician to feel satisfied with his patient's condition until he suddenly realizes, owing to the onset of serious symptoms, that an intracranial complication has supervened. The classical symptoms—redness, swelling and tenderness—are quite common in children, owing to the thin, spongy cortex being rapidly perforated by carious erosion, the pus collecting between the periosteum and bone. We should never wait for these symptoms, any more than we would delay operation on the appendix until symptoms of perforation of the same appear.

The bacteriology of the discharge, as well as its quantity and quality, is very helpful in aiding us to decide on operative intervention. The blood count, too, I depend upon. The leucocytosis represents the patient's resistance and the polymorphonuclear percentage represents the severity of the infection. A high leucocytosis with a relatively high polymorphonuclear percentage means that one is balancing the other. If there is a drop in the leucocytosis and a rise in the polymorphonuclear percentage, the infection is overwhelming the resistance of the patient, and the outlook is bad. With a high leucocytosis and a drop in the polymorphonuclear percentage, an increasing resistance to the infection is indicated.

The X-ray is chiefly valuable in locating the sinus; in addition, an expert is able to determine the presence of bone necrosis. This is highly technical and should always be done by an expert.

I quite agree with Dr. Emerson in his conclusions relative to the indications for operating on the chronic variety of mastoiditis. My experience is that the majority of our intracranial complications arise in connection with the recurrent type of chronic mastoiditis.

DR. GEORGE M. COATES: One type of acute mastoiditis that has always seemed to me cause for more prompt interference than any other is the acute mastoid suppuration that complicates the acute infectious diseases of childhood, such as scarlet fever, measels, etc., when the mastoid melts away, almost over night, after the first symptoms of infection of the middle ear. I have had cases with no history of middle ear infection and two or three days after they arrive home, start up a suppuration with well developed mastoiditis. I have seen it happen in thirty-six hours after the first symptoms have been discovered. I have also seen one or two cases where the patient came into the hospital, after scarlet fever, in the afternoon, the operation being postponed until the next morning, and facial paralysis occurred in the meantime. I do not mean

that we cannot wait, as very often we can wait, but we must be very much on our guard.

One type of mastoid that Dr. Emerson, I think, did not speak of, where we may have very little aid from our inspection of the membrana tympani and of the middle ear, is the so-called "primary mastoiditis." There the infection has left so little trace behind it that the patient is unaware that he has had any middle ear infection. Even congestion of the middle ear may have entirely disappeared. Last winter we had an unusual number of these cases that showed no evidence of the passage of the infection through the middle ear and yet they had suppurative mastoids as proved by operation. Definite symptoms of mastoiditis are at times very difficult to diagnose, especially when complicated by an external otitis. It is there that your X-ray examination is possibly of benefit. I have had some sad experiences with the X-ray. As a rule, I think I agree with what Dr. Smith has just said. The chief use of the X-ray is to show the exact position of the sinus. If we can wait until the walling-off process has occurred, it is, I believe, very beneficial to your patient; there is undoubtedly better healing. On the other hand, it is poor policy to wait too long, to let your patient get too far advanced. I sometimes thought that I had operated too soon (particularly in my early days). Two years ago I operated on a really normal mastoid to attempt the extraction of a piece of shrapnel. It was not there, but that mastoid was a normal one. There was no question about it. The whole picture was entirely different from a congested mastoid or any mastoid that I had ever seen. It was a pinkish, pearly color, smooth and of course the cell tissues and walls were all normal. In an epidemic of mastoiditis connected with measels in the army, we had so many atypical cases that I found I had to revise my ideas of the symptomotology of mastoiditis which I had in my civil practice. I found that the old ordinary rules did not carry as they had at home. After seeing in a good many of these (we had seventy operations in a few months) that incision of the membrana tympani had to be repeated, because of premature closure and the drum had to be reopened, repeated incision was considered a very good indication for operation. Sagging of the posterior canal wall we found to be the most reliable indication. Often a thick cortex did not give us tenderness over the mastoid, and there was frequently no pain. Nipple perforation, and sagging of canal wall without pain were our most reliable and usual indications.

Dr. Fenton (Portland, Oregon): It was a very distinguished pleasure and privilege to hear Dr. Emerson and to hear the splendid discussion. I have only to say that I should like to thank Dr. Emerson for expressing his approval for the removal of tonsils and adenoids shortly before or during the existence of an acute otitis. I should be glad to hear of his further experiences in that regard. In regard to the use of the use of the X-ray, I should like to ask Dr. Emerson, if in his experience at the infirmary, he has found that when the line of cells immediately behind the meatus are alone filled up or whether they did not tend to clear up spontaneously, whether the cells above the base line are filled up and whether that does not tend eventually to lead to operation. I have also been very glad to hear his defense of the relatively early operation in the chronic cases. I think that too little emphasis has been laid to that of late.

Dr. S. A. Brumm: Mr. Chairman and members, I want to have the privilege of thanking Dr. Emerson for giving us this very instructive and interesting paper this evening, and for his views on this most important branch of Oto-Laryngology.

I agree absolutely with Dr. Emerson as regards his indications for operating upon acute mastoids except as to the defined time of ten days duration, this I feel, can not be measured in any definite time but that each case is a law unto itself.

Now as to the indications for operating on chronic cases.

First, I do not believe that all so-called chronic ears are indicative of radical mastoid operation; I feel that before we can do a mastoid operation that we must classify our cases.

For instance, the chronic intermittent type with pent up pus, or with profuse discharge, having the associated pain, tenderness and temperature at times, vertigo certainly means operation.

Again, where you have defined death of bone or sequestra, there is but one thing to do and that is operate.

But because there is a chronic discharge, with cholestomatous and polypus formation, especially with complete or partial destruction of the ear drum, is by no means a case which should be brought to the operating table, certainly not until you have tried thoroughly, local treatment.

Again, where you have a well ebernized mastoid I can see no reason for an operation. What better barrier can we have?

The intermittent ears due to naso-oral defects, certainly require no operation until these defects have been removed.

I think the essayest will agree with me when I say that it is possible to obtain absolutely dry ears and even complete formation of the epithelial layer of the ear drum.

Again, who knows just how the mastoid process and cells are involved as the ray is our best guide and we all agree that is not definite.

I do believe that we are going to develop a way by which we can say absolutely which type we shall operate upon and which type we shall not, as for instance along the lines which Dr. Kopetsky is working, *i.e.*, by taking some of the curretments and examining them for boney material by chemical means.

Finally, I wish to remind you that granting we do operate upon all chronic ears, the best we do is to secure 75 per cent of cures after radical mastoid operations.

DR. HENRY S. WIEDER: I also wish to express my appreciation of Dr. Emerson's paper. I wish to ask for further light. In his paper he has not mentioned tuberculous disease of the mastoid and middle ear, which I feel is a rather important thing to have cleared up. Should the mastoid be operated on in the presence of tuberculous necrosis as quickly as it would be in the case of ordinary mastoiditis, because of the well-known fact that these cases do not do well, some failing to recover. I would like to know Dr. Emerson's viewpoint with reference to those cases that begin with a painless discharge, with original infection in the larynx possibly, and have some slight involvement of the mastoid. Has it been his practice to operate, what type of operation does he do and what procedure does he use in handling these cases?

DR. WM. G. SHEMELEY: I did not hear Dr. Emerson mention anything about Wassermann tests. We frequently find that cases which simulate mastoiditis or cases that run an atypical course following the opening of a mastoid cortex show a plus Wassermann. These improve quite readily under anti-syphilitic treatment. Dr. Emerson mentioned tenderness over the mastoid. Frequently in those cases you find the mastoid cortex is quite hard and thick. The reason you do not get the marked tenderness is because the layer is so dense.

DR. BENJ. H. SHUSTER: I would like to ask one question. Dr. Emerson stated that he would not operate on an acute mastoid during the congestive stage, but would wait until there is a walling off. By what signs can you tell that the stage of congestion is past and that the walling off process has taken place.

I would also like to ask Dr. MacKenzie a word of explanation in reference to the tuning fork test which he describes. How would it work out in a man suffering from acute mastoiditis but previously had a shortened Schwabach due to some other condition, *i.e.*, nerve involvement due to syphilis, boiler maker or as it has recently been shown in many cases of chronic catarrhal otitis media there is often a diminished bone conduction. It is also well to note that in children who are probably the

most frequent sufferers of mastoiditis, the test might not be reliable because the child may not give a reliable answer to your question.

DR. ROBERT F. RIDPATH: I would like to ask Dr. Emerson whether among the symptoms of children, especially young children, he has found the symptom of difficulty of deglution indicative of mastoid involvement. I recall quite a number of cases in which the babies of a few years old having mastoid involvement, one of the symptoms which seemed to be always present was painful deglutition. I have failed to find this symptom in the literature and I recall two cases in babies of one year of age, where we had no other symptom to go by except this symptom. This is due to the pulling on the little mastoid tip by the action of the muscles of deglution. The membrane was not swollen, nor bulging, no pain over the mastoid and yet the one symptom of painful deglution was sufficient indication for operation and the evacuation of the pus cleared the case up entirely.

DR. FRANCIS P. EMERSON (in closing): I thank you for the very kind way in which you have received my paper.

In the first place, in respect to what Dr. Fenton has said in regard to tonsillectomy. There is a difference of opinion in Boston as to whether we should do a tonsillectomy or adenectomy in connection with an acute middle ear, particularly in children. This question, I think, is open to a difference of opinion but, personally, in every case of post-aural abscess in children I have the adenoids removed at the time of the operation. In cases of acute middle ears in children, Dr. Leland believes that it often saves a paracentesis. I feel that those cases which do badly are cases in which the Eustachian tube is already so badly infected that a middle ear will result whether the adenoids are removed or not. I have seen good results from it and am inclined to follow it up. I am not sure that I would do it in every case. In cases of acute and chronic mastoiditis it is a source of regret that focal infections of the sinuses and nasopharynx cannot be cleared up in every case before they are operated. If we only treat the end result without removing the cause we are liable to get a recurrent mastoid or a reinfection of our radical mastoid cavity. These foci are usually chronic with recurrent acute exacerbations. If it is not feasible to remove the cause before operating this should be done before the case leaves the hospital. In the case referred to, in which a double mastoiditis had been done, it was so obvious that the middle ear had become reinfected that the tonsils were removed immediately.

In regard to the X-ray. This is useful to confirm our diagnosis. Sources of error are found where there is granulation tissue which cannot be distinguished from pus, and in some cases of diploetic mastoids. In pneumatic mastoids with large cells, sometimes overlapping deeper ones, we may be led astray. The main thing is reliance upon the clinical diagnosis, confirmed by the X-ray. The zygomatic cells we always drain. It does not seem necessary to go over the roof of the middle ear as much as is advocated by some. It is impossible to exenterate the mastoid and remove all the cellular structure. The important thing is to remove all the necrotic and infected bone and no more. It is bad surgery to enlarge the aditus so much that there is a delay in walling-off the middle ear in the healing process.

In regard to what Dr. Smith said with reference to myringotomy. When we speak of "paracentesis" we mean a wide incision, including the posterior quadrant and the lower part of the drum. It was a practical point which he made with reference to suction. The local tenderness referred to by Dr. Smith in chronic mastoiditis may be entirely absent. The diagnosis in acute and chronic mastoiditis must be considered from different standpoints. In acute mastoiditis we have a toxic process with marked local symptoms. In chronic mastoiditis we have reflex symptoms resulting from pressure necrosis with but few local symptoms. These cases are frequently overlooked because the

middle ear suddenly stops discharging and the symptoms are all remote, many being diagnosed as meningitis in a stage when operation might have saved them.

We agree with Dr. Coates in what he said in regard to mastoiditis during the course of infectious diseases. In measles there is very rapid bone destruction. This does not seem to be because of a difference in the type of infection but because of the poor resistance of the patient. The cases of primary mastoiditis to which he refers are probably cases in which there is an early shutting-off of the aditus, although really an extension from the middle ear. These cases are difficult to interpret because we have none of the middle ear indications to help us.

Dr. Coates refers to the danger of opening a normal mastoid. If we have a virulent middle ear we always have mastoid involvement. The question then is whether its cellular stricture is going to break down and whether the time has arrived when operation will be followed by the best results because of a leukocytic walling-off of the infected area. The character of the discharge, the length of time that the mastoiditis has been going on, the general appearance of the patient, as well as the question as to whether the local tenderness has extended back of the tip, are all symptoms that help us to arrive at the decision whether to operate or not. In the case of chronic mastoiditis with polypi, referred to by one speaker, we should distinguish quite sharply as to where the polypi come from. Polypi should never be removed in the office or out-patient department, but be made a hospital case. Polypi springing from the promontory or oval window, in cases of chronic mastoiditis with acute exacerbations, are usually better operated.

In regard to tuberculous mastoiditis. Whether we operate or not depends a great deal on the condition of the patient and how the drainage is going on. If we can, we do not operate on a tuberculous mastoid, unless we feel that it is absolutely necessary, as long as the general tuberculous process is active. If the mastoid has to be opened we should do it under local anesthesia. In cases of chronic mastoiditis the Wassermann test should always be done.

In regard to Dr. Babbitt's question, I do not feel that an infected ear necessarily goes on to an adhesive process later.

I want to thank Dr. MacKenzie for his test. It is something I do not know anything about.

In regard to Dr. Ridpath's observation that children may have difficulty in swallowing in connection with post-aural abscesses. In these cases the trouble is mostly in the antrum and if it breaks through it does so above. It would seem as though the difficulty in swallowing would be more in connection with the infection in the nasopharynx than through association with the mastoid. We have never observed this symptom in connection with mastoiditis.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON RHINOLOGY AND LARYNGOLOGY.

December 21, 1921.

(*Continued from page 242, March issue.*)

Acute Sinusitis Complicated by Optic Neuritis. Dr. Frederick S. Lovell

The patient, female, is 24 years old. About six weeks ago she woke up in the morning and felt something in front of her left eye. On wiping the eye it did not pass away, and on closing the other eye she discovered that she could not see with the left eye. Several general practitioners were consulted who advised glasses, and she finally drifted into the office of one doctor, an oculist, who said the fundus and media of the eye was all right. She came under my care a week after she first discovered that she could not see. An X-ray picture was taken, all sinuses appeared normal, and I could not think of operating for which I suspected was the trouble, but did operate on the left posterior ethmoid and sphenoid. Nothing was found in the ethmoid, but the sphenoid contained a sort of jelly not unlike the white of egg—no pus. The next morning she said she could see hand motion, and has been improving steadily until today she has 20/20 vision. No pus has appeared in any of the sinuses operated.

DISCUSSION.

DR. KING asked if the patient was totally blind in one eye.

DR. LOVELL replied that the patient could discern only light.

DR. KING then inquired whether a Wassermann test was made.

DR. LOVELL replied that no test was made at the time, but that a previous test was reported negative.

DR. KING then said that he had a similar case last year, in collaboration with Drs. John J. Cotter and A. S. Kelly. The patient had been blind in one eye for a day, and Dr. Kelly said that it was due to ethmoid and sphenoid conditions. The sphenoid and ethmoid cells were opened on that side, and in two or three days she was able to recognize large objects in the room, and the vision improved so that at the end of three weeks she had 20/40 vision in that eye. She was observed by a number of men at the New York Eye and Ear Infirmary. One of them suggested that a Wassermann test be made, and it proved to be four plus. For two weeks the patient had intensive specific treatment. Notwithstanding the specific treatment, however, she became totally blind in the other eye, and the heroic treatment was continued, hoping to restore the vision. At the end of a week it was deemed unwise to wait longer, and the ethmoid and sphenoid cells on the left side were opened up; shortly afterwards she began to see in that eye also. In two weeks she had 20/40 in both eyes.

In view of this experience, we are justified in presenting the following conclusions:

1. That in sinus disease affecting vision operation must be done early if sight is to be restored.

2. Where the case is complicated by a positive Wassermann, treat the specific condition and at the same time treat the sinus as if syphilis were not present.

Acute Esophageal Obstruction; Angio-Neurotic Edema as Causative Factor. Dr. H. H. Forbes.

DR. FORBES said that the case, presented under the head of pemphigus of the pharynx, came to his attention through an attack of acute esophageal obstruction.

Male, aged 47, a native of Austria, was admitted to the New York Post-Graduate Hospital on October 1, with a history of inability to swallow, of acute and non-traumatic origin. As the patient gave a history of previous acute attacks of a similar nature, and as a general pemphigus

as well as a pharyngeal pemphigus was present, the case was treated as an angio-neurotic edema.

X-ray: Complete obstruction; no area canalization. Alkali enema and atropin and adrenalin were given. In twenty-four hours there was a complete return of ability to swallow food, and the X-ray examination was negative.

Acute Lung Abscess Treated by Bronchoscopy and Irrigation. Dr. H. H. Forbes.

Male, aged 23, was admitted to the service of Dr. Chace at the New York Post-Graduate Hospital on September 16. Discharged, November 6, improved.

The patient referred the beginning of his trouble to a swim in the river, where there was a possibility of direct infection from inhalation of some infected material. Before admission the history was that of acute onset, cough, fever, and prostration, followed by profuse expectoration of yellowish material with putrid odor; followed by great loss of flesh and strength.

On admission the X-ray showed bronchiectatic dilatation of the right middle and upper lobes. The diagnosis of lung abcesss was made. The patient continued to grow worse, and after consultation with Drs. Loughran and Silleck it was decided to open the lung. The case, however, was thought to be a poor surgical risk, and the washing out of the lung through a bronchoscopic tube was suggested. This was done, although the patient was almost in extremis. After the first irrigation there was a drop in the temperature, and from that time onward the patient continued to improve.

Dr. Imperatori said that he was convinced that irrigation of lung abscess, following Dr. Yankauer's method, was the proper procedure.

However, there was always the possibility that these cases were tubercular. He himself had reported a series of such cases before the American Laryngological Association. Of this series of cases—the number being less than ten—six had gone to autopsy and were all shown to be tubercular, although none of them had had tubercle bacilli in the sputum. Repeated examinations, some as high as twenty.

Two cases were still living.

Regarding the cure of these cases of lung abscess, Dr. Imperatori did not feel that he could say anything definite yet.

Dr. M. C. Myerson asked those who were interested in bronchoscopy to aid him in explaining the result in the following case:

Last June a girl of five was referred with an abscess of the left lower lobe of the lung. She had had a pyelitis at the age of two and a half years. Shortly afterward she developed a cough and began expectorating sputum, which continued for two years. She was rather poorly nourished and her physician referred her for bronchoscopic irrigation, thinking it might help. She was then expectorating a cupful of sputum in twenty-four hours. She was bronchoscoped twice and the cavity irrigated; after the first time she expectorated less, and since the second time, in the latter part of June, she had not expectorated any pus. This child was treated in Dr. Arrowsmith's service at the Kings County Hospital.

Dr. Imperatori said that Dr. Yankauer was authority in this class of work. He had presented a number of cases before the Section, and all were improved, but not cured.

Dr. Forbes corroborated what Dr. Imperator had said (about cases being improved rather than cured), and said he thought his remarks had been somewhat misunderstood. This was a case of acute lung abscess, and the history dated back only six weeks before he was admitted to the hospital. The history, so far as it was obtainable, gave as a probable cause swimming in very dirty water, and the inhalation of some infected material. There was an acute condition with high fever and the patient's condition was such as to lead one to believe that he would have died without some treatment; yet the surgeon did not feel that

the man was a surgical risk and would not operate; with this irrigation the infection was removed and it seemed to me more than probable that the irrigation saved this man's life. It was entirely different from the chronic cases which all have seen and in which the treatment must be continued—certainly in some cases for a very long period of time.

DR. ZABROEWSKI of Warsaw was introduced to the Section and spoke a few words of greeting from the Oto-Rhinological Society of Warsaw.

Additional Experimental Studies in Bronchial Function. Dr. Jesse G. M. Bullowa and Dr. Charles Gottlieb.

(Published in this issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. GOTTLIEB confirmed Dr. Bullowa's statements, and said further that they had been waiting to have other radiographs made to corroborate these experiments, by pumping a little bismuth into the lungs of a dog and watching the peristaltic movements. It was a very dramatic thing to witness.

DR. LEWALD said he was very much interested in the work that Dr. Bullowa was doing. Several years ago he had presented three cases in which bismuth had accidentally entered the bronchial tract during an examination for esophageal carcinoma, and they were very much surprised to note how little disturbance the bismuth set up in the lungs. In one case, after a few hours practically no bismuth mixture could be found on radiographic examination. This bore out Dr. Bullowa's statement that there is a rapid expulsion of foreign material of this nature. The exact nature of this no one seemed to have thought much about until Dr. Bullowa directed attention to this peristalsis which he seems to have demonstrated by these experiments.

DR. IMPERATORI said that Dr. Bullowa's paper was a most important one. Both Dr. Bullowa and Dr. Gottlieb were to be congratulated on their work.

The difficulty in keeping foreign bodies within the air ways of animals was great and unless the foreign body was sharp or pointed the animal would very shortly cough it out.

Following a suggestion of Dr. Lynah, Dr. Imperatori started a study of cases of lung abscesses and used thirty per cent bismuth solution in FiVELaryngoscoype (Socieyt Proceedings) March 9CCS ldDD;-isactr olive oil. These cases were examined within five days and it was rare to find any bismuth within the cavity. Occasionally, bismuth sulphide was found, but these were in the very foul smelling cases.

Dr. Imperatori said that he had doubts as to the efficiency of bismuth as a sterilizing agent in these cases and that the benefits obtained were due to simple irrigation and drainage.

He had known of the work that both Drs. Bullowa and Gottlieb were doing and enjoyed this contribution very much, particularly with regard to the peristaltic action of the bronchi.

The Involuntary Nervous System of the Nose and the Mechanism of Some Obscure Nasal Symptoms. Dr. L. Hubert.

(To be published in a subsequent issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. IMPERATORI asked whether it was not true that sneezing is a conscious act. If a patient is anesthetized you cannot make him sneeze.

DR. HURD asked how Dr. Hubert explained anesthesia of the cornea after injection of the spheno-palatine ganglion with alcohol.

DR. HUBERT replied that impulses along the afferent neurons do not pass only to the sneezing center in the medulla, but that some of them pass along purely sensory nerves and are transmitted to sensory areas of the cerebrum. When these sensory areas are stimulated sneezing becomes a conscious act. Replying to Dr. Hurd, he said that there is no anatomical reason why one should not get an anesthesia of the cornea if the alcoholic injection is confined only to the spheno-palatine ganglion.

SECTION OF OTOLOGY,

January 13, 1922.

Cases of Extraordinary Severe Tinnitus Aurium Developing a Few Hours After Exposure. Dr. Sinclair Tousey.

(*To be published in a subsequent issue of* THE LARYNGOSCOPE.)

DISCUSSION.

DR. DENCH expressed regret that he had not heard the earlier part of the paper. The case was an extremely interesting one. Much importance was now being attached to the various sources of infection and it was now recognized that the teeth play a much more important part than was formerly thought, so the reports of this kind were a valuable contribution to scientific medicine. Those who were paying attention to the ear knew that tinnitus was one of the most distressing symptoms from which patients suffered—sometimes it was the only thing complained of and it was difficult to find the cause of it, the ear apparently being normal. Many of the cases were toxic, and Dr. Tousey had pointed out the source in this instance.

DR. HURD said he had seen a number of cases of tinnitus definitely due to infected tooth roots. One man seen two or three years ago could only hear the watch at two inches. He had an infected canine which was removed and healed over, his hearing increased to thirty-six inches for watch, leaving, however, a pocket in the socket, and his hearing went down two inches. That happened two or three times before the condition healed up entirely.

DR. GUTTMAN said in as much as tinnitus is always caused by an irritation of the high pitched nerve fibres of the acoustic nerve, was it not possible that the irritation of the nerve was due to the exposure and that it was rheumatic in character?. What was the hearing power of the patient at the examination? He had observed, that in every instance tinnitus was connected with or had a certain relation to diminished hearing power. If in a case of this kind the hearing power of the patient would be examined it could then be determined as to how much the tinnitus was due to the tooth condition, or to a rheumatic affection of the auditory nerve.

It was interesting to note that many persons have diminished hearing for certain high pitched notes without having personal knowledge of it.

DR. TOUSEY, closing the discussion, said that in this instance the patient was a specialist in the nose and throat and had not noted any change in the hearing power. He did not know how complete an examination had been made, but the man had consulted an aurist and it was probably quite a complete examination. There was, however, a very real lesion of the auditory apparatus and Dr. Tousey believed that the dental infection acted as a predisposing and aggravating cause. He thanked the gentlemen who had expressed their appreciation of the case.

Labyrinthine Surgery, Difficulties Encountered in the Diagnosis. Present Day Views of the Operation. Results. Dr. J. Morissett Smith.

The problem of when an infected labyrinth should be operated upon and the method of election is still an exceedingly interesting and difficult one, for the number of cases requiring operation is so small that even in large clinics the opportunities for observation and operation are very rare and the statistics are very limited. It seems an established fact that at one period in the past there were too many labyrinthine operations performed; the mortality was entirely too high, so that at the present time surgeons are inclined to be more conservative and to regard the invasion of the labyrinth as a grave undertaking, especially in the presence of an active infection.

In considering the subject the fact must be kept in mind that if the infection could be limited to the labyrinth alone there would be little danger, and that it is not a labyrinthitis but a meningitis that is responsible for the mortality. The whole problem then resolves itself into

the determination of the question as to whether an operation in the individual case will limit or prevent intracranial extension of the labyrinthine infection. The reduction in the mortality resulting from labyrinthitis observed in recent years is due partly to the fact that certain cases have not been operated upon and partly to the method of operating, and the two factors that stand out as material aids in this reduction are the improved knowledge of labyrinthine functions and the analysis of the spinal fluid. Owing to the invaluable work of Barany, it is now possible to say very definitely whether or not the labyrinth in part or as a whole is functioning.

In the general consideration of these cases the writer of the paper believes that it is very important to know just what part the temperature plays, and he believes that so long as the infection is confined to the labyrinth there will be little or no rise in temperature, and that should a sudden rise occur it is most likely a warning of the extension of the infection beyond the labyrinth, ruling out, of course, other systemic causes that might be responsible.

The analysis of the fluid furnishes the best method of determining, in time to be of some assistance to the patient, whether or not the infection is confined to the labyrinth or whether it has extended to the meninges. This is most important. A normal fluid will not show increased pressure, is clear, has about 6-8 cells lymphocytes per c.cm., reduces Fehling's solution, gives a negative globulin reaction. In a diffuse meningitis, the fluid is cloudy, and under pressure and cell count runs into the thousands, with a marked increase in the polymorphonuclear cells. It does not reduce Fehling's solution, gives a positive globulin test, and shows bacteria in the fluid. If the infection becomes localized, an increase in the polymorphonuclear cells is shown. The cells increase with the spread of the infection and decrease as the localization increases. If the infection is aken care of by the resistance, the cells return to normal and the case recovers. If a diffuse meningitis intervenes, the fluid becomes purulent with *free bacteria* and the patient dies. Even though the cell count runs into the thousands, if there are no bacteria present, it shows still some localization and there is a possibility of recovery. The writer's observations are that in spite of an occasional report to the contrary where bacteria appear in the fluid the patients usually die.

In order to facilitate the discussion of the different types of labyrinthine infections, and the best methods for relieving them, they may be divided into three classes: (1) perilabyrinthine and circumscribed labyrinthitis; (2) diffuse purulent latent labyrinthitis; (3) diffuse purulent manifest labyrinthitis. The term serous labyrinthitis is omitted since it is supposed to occur with an active labyrinth and would fall under type 1, although it must be remembered that at any time one type may be converted into the other. Under the head of peri-labyrinthine cases are included those cases which have an inflammation around the labyrinthine capsule causing some labyrinthine symptoms but no real infection in the labyrinth itself. Such cases show an active labyrinth and usually clear up at once following removal of cause. The circumscribed infections are usually due to a fistula in the horizontal semicircular canal. In any event there is still an active or partially functionating labyrinth. It is now generally agreed that no case of labyrinthitis showing evidence of remaining functiion should be operated on. Ruttin reports 43 cases of circumscribed labyrinthitis with partial or complete function in which the radical operation alone was performed, and all recovered.

In cases of diffuse purulent latent labyrinthitis with total destruction of function but no active evidence of infection but active evidence of infection, there is a dead labyrinth. If a spinal fluid analysis is made, in the event of a normal fluid one can be reasonably certain that the infection is limited to the labyrinth, the meninges having been successfully walled off by nature. In such cases no operative procedure should

be instituted which will interfere with this barrier. This is most important. Where there is an infection of the middle ear but a quiet labyrinth only the most conservative measure should be considered.

It is in the cases of diffuse purulent manifest labyrinthitis that the real difficulties are encountered. Here there is an active process with the problem of preventing or relieving an intercranial extension of the infection. Either there is a very active labyrinthitis from which meningitis may be feared, or there is some definite evidence of meningeal involvement. In such cases the first step should be a spinal puncture, and in the event of a normal fluid and no temperature the case should be carefully watched before any operation is attempted. It has been proven that operation in the very acute stage offers less chance than one performed where the process has had a chance to become quiescent. In those cases of acute labyrinthitis followed immediately by a diffuse meningitis, in which the patient almost immediately becomes unconscious, with a high temperature, double Kernig, stiff neck, fluid cloudy and filled with bacteria, the writer feels that any operative procedure is hopeless. This leaves those cases in which there is some evidence of meningeal involvement, either through the symptoms of spinal fluid, but it is not diffuse, and there is therefore a chance that an operation may help. In such cases, when and what type of operation should be performed? A very important question here is the presence or absence of bacteria in the fluid. In cases where there are none, there is always a possibility of recovery. With bacteria in the fluid, if surgical intervention is decided upon a very complete operation is indicated—either by the Richards or Neumann method—realizing at the time that there is little or any hope of recovery.

Cases were cited to show how difficult it is to decide, and that one may be wrong in deciding either for or against operation. Generally speaking a good rule is to operate if the findings show progression of the infection, and further observation if it shows improvement. Where there is a tendency to localization of the meningitis, repeated spinal punctures should be done, for both diagnostic and therapeutic purposes. Where there is an accidental injury to the labyrinth during a mastoid operation, the best procedure would seem to be to keep the patient under careful observation, performing a secondary labyrinth operation if necessary, rather than a labyrinth operation at the time of injury.

CONCLUSIONS.

Considering the number of ear infections the labyrinth operation is very rarely indicated.

Where there is any labyrinthine function still present, a labyrinth operation is contra-indicated.

Where there is a dead labyrinth, no symptoms, and a normal spinal fluid, only the most conservative operation should be attempted.

A spinal fluid analysis with a culture, furnishes the most accurate information as to the progress of the infection.

The prognosis in types one and two is very good, and very doubtful in type three.

The problem presented in type three at present is a very difficult one, and we must bear in mind the possibility of a very radical operative procedure inducing as well as preventing a diffuse meningitis.

DISCUSSION.

DR. DENCH said that Dr. Smith had stated so clearly the best and most conservative views on the subject that little could be added, and what he had to say was chiefly confirmatory of Dr. Smith's very excellent remarks. He had been gratified to hear him emphasize the point in contravention to the teaching of the German school some years ago that every dead labyrinth should be taken out. He, himself, had followed the opposite theory for many years. If there were no labyrinthine symptoms, he proceeded independently of them and in very few instances had he been obliged subsequently to interfere with the labyrinth.

He also heartily concurred in what Dr. Smith had said about the examination of the spinal fluid. A persistent high cell count was a good indication for operation. In the invasion of the labyrinth there may be an increase of the cells in the spinal fluid up to 100, even though there is no actual invasion of the meninges. Following this cell count, as Dr. Smith had suggested, one could form a good idea as to the limitation of the process. If the count went very high—above 500 or 1000—the extension was apt to be rapid. If the cell count of the spinal fluid should greatly increase, one would be justified in interfering with the labyrinth. If there was evidence of a dead labyrinth or a history of such symptoms being present shortly before the patient came under observation. If a case was allowed to go on with these manifest symptoms, without operating, one felt that he had done wrong; the opposite was also true, and if the patient developed meningitis, one would be in doubt as to whether if nature had been allowed to wall off the cavity more thoroughly the patient might not have recovered. Many years ago he had seen a patient with a grave and acute mastoiditis, and sudden labyrinthine symptoms, with high temperature. The patient was seen on the fifth day after the onset. On the third day the temperature had been high, and when he observed the case the temperature was normal. The labyrinth was dead. The mastoid was clean, and there was no injury to the labyrinth, so he advised letting the patient alone, and he made a good recovery. In a similar case later, the patient died. Dr. Smith was absolutely right when he said that at the present time we are very much in doubt, even in the presence of certain clinical symptoms. Certain cases may seem to need operation but with delay they get well; in other cases where it seems best to delay operation the patient may go on to death. It was very difficult for any one to make any broad statement excepting where there were distinct symptoms of frank invasion of the labyrinth, and then the labyrinth should be taken out. The cases that go slowly were the puzzling ones, and it was gratifying to hear Dr. Smith say frankly that there were times when one did not know what to do.

Dr Dench asked whether when Dr. Smith spoke of increased leucocytosis count he referred to the spinal fluid count or to the increased blood count. (Dr. Smith replied: "In the blood count, where there was involvement.") Dr. Dench disagreed, for in cases where the labyrinth alone is involved you get a certain increase of leucocytes. Perilabyrinthitis cases are very interesting and very confusing. A certain number of them recover with removal of the pin labyrinthine tissue and restoration of circulation within the labyrinthine capsule to normal

The case of the plumber which had been cited was hardly invasion, but rather a case of concussion; even though there were positive symptoms, Dr. Dench said he would not have operated in a case of that kind. He also expressed gratification that Dr. Smith had not split hairs on the subject of diffuse purulent labyrinthitis, etc., for it was very difficult to make a differential diagnosis in these conditions at the present time. He had seen a number of acute cases with meningeal symptoms, and even where the cell count was high many of these cases got well without operation. There was no invasion of the spinal fluid with bacteria. Changes in the chemical constitution of the blood may cause the so-called serous meningitis; these cases get well without operation. All the acute cases where there are frank symptoms, and spinal fluid cell count is increased are not necessarily fatal. Dr. Perkins once operated on a boy, a patient of the speaker's, with high temperature and all symptoms of meningitis. In addition to removal of the labyrinth and incision of the dura over the area triangularis, a decompression operation had been done in the middle fossa, and when the boy came under Dr. Dench's observation there was almost as much brain tissue outside as inside. Under treatment with Dakin's fluid he made a complete recovery, but died six months later from a re-infection. He had a meningeal fistula and refused operation for closure.

Dr. Dench was interested in what Dr. Smith had said about the possible tearing of the dura over the area triangularis. He, himself, had had a case at St. Luke's a couple of years ago. The patient had had no labyrinthinitis symptoms, when a radical operation had been done for a chronic middle ear suppuration. He came in a month later with acute invasion of the labyrinth. At operation an erosion was found over the horizontal semicircular canal, which undoubtedly occurred subsequently to the radical operation. In taking out the labyrinth the dura was torn externally to the internal auditory meatus. Infection was expected, but the man made a good recovery. That could be explained, for the fluid is always under pressure and tends naturally to wash out any infection from the subdural space rather than to allow it to penetrate, just as by constant irrigation.

With reference to the treatment of the labyrinth, if it is accidentally injured during the operation, Dr. Dench said he agreed with Dr. Smith Two years ago Dr. Richards reported a case in which the stapes was removed accidentally, and the patient had a meningitis and died. Dr. Richards was inclined to formulate a rule that in such cases one should drain the labyrinth. Dr. Dench said that four or five weeks later he had a similar case at St. Luke's and packed over the oval window, etc., with iodoform, and the patient made an uninterrupted recovery—with a dead labyrinth, of course. One cannot make a definite rule excepting that the labyrinthine cavity must be made as aseptic as possible, and that one should be more careful than otherwise if the labyrinth is accidentally injured.

The value of spinal puncture in these cases is sometimes lost sight of. Spinal puncture in beginning labyrinthine involvement has some value, unless in a case where the infectious organisms are actually in the spinal fluid; the restoration of the intercranial pressure has a certain amount of therapeutic value. The Section was certainly indebted to Dr. Smith for the careful manner in which he had prepared his paper and presented this subject.

Dr. L. W. Dean, (Iowa City), expressed gratification at the conservative tone of the paper. In his own experience the more conservative he had been in treating labyrinthine cases the better the results secured, so far as life was concerned.

The research work of Wittmaack has some bearing on this matter. He showed that in some cases of vertigo accompanying non-suppurative lesions of the middle ear he had not found hemorrhages in the labyrinth causing the vertigo but that the vertigo was due to a disturbance of the lymphatic circulation increasing the pressure within the labyrinth.

Dr. Dean said that he thought of the labyrinthine complications of acute suppuration of the middle ear and of acute exacerbations of chronic suppuration of the middle ear as being of three types. Unfortunately, there is no way of differentiating clinically in the early part of the disease between the three. First, there is the hydrops of the labyrinth, a condition characterized simply by an increase in the amount of normal fluid in the labyrinth. In this type, with the return of the normal amount of fluid and normal pressure, there is a return of function. The second type is the sero-fibrinous labyrinthitis. Wittmaack has shown that the difference between this and suppurative labyrinthitis is due to an absence of, and dehiscence in, the wall between the middle and inner ear. This condition may become suppurative in a few hours. In sero-fibrinous labyrinthitis, the exudates organize and may produce permanent loss of function. As there is no pus in the inner ear the mastoid wound may heal perfectly. The third type is the suppurative type in which there is always a dehiscence of the wall between the middle and inner ear. This is the very dangerous type.

(*To be continued*)